United States
Department of
Agriculture

Forest
Service

May 2004

CHANDLER ROUND VEGETATION MANAGEMENT PROJECT

Towns of Chatham and Jackson

Carroll County, New Hampshire

Environmental Assessment

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Chandler Round Project EA

Cover Sheet

Management Action: Timber harvest to implement timber and wildlife habitat management goals in the Chandler Round Project Area, HMU (Habitat Management Unit) 505.

Agency: United States Department of Agriculture, White Mountain National Forest, Saco Ranger District.

Cooperating Agency: New Hampshire Department of Fish and Game

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Responsible Official: District Ranger Terry Miller

Abstract

The Chandler Round Project is located in the Towns of Chatham and Jackson, Carroll County, New Hampshire. The project lies in the center portion of the Slippery Brook drainage, and in the headwaters of McDonough Brook, a tributary to Little Cold River. Slippery Brook is the primary drainage for the analysis area. Other small tributaries within the project area are unnamed. Chandler Round project area contains approximately 976 acres of proposed treatments within the 8375 acre HMU 505. The analysis area contains MAs 3.1, 6.1, and 6.2, as identified in the White Mountain National Forest Land and Resource Management Plan. This includes approximately 5,691 acres of MA 3.1.

"**No Action", Alternative 1**, does not propose active management within the project area.

The Proposed Action, Alternative 2, would diversify wildlife habitat in terms of successional communities and softwood development, harvesting approximately 6.0 MMBF (million board feet) of timber from approximately 976 acres of National Forest lands. Project objectives are to enhance softwood habitat through approximately 200 acres of single-tree selection and 35 acres of thinning, increase early successional habitat by creating approximately 200 acres of hardwood regeneration habitat through clearcutting, and improve timber quality and species composition in hardwood and mixedwood stands through approximately 162 acres of commercial thinning and 379 acres of single tree selection. Proposed operating seasons would be summer, fall, and winter. The action alternatives would achieve the management goals (Purpose and Need) of diversifying wildlife habitat and producing timber products.

Access to the project is via National Forest System Road 17, Slippery Brook Road. The Proposed Action would:

- Restore to current design standards through pre-haul maintenance the following existing National Forest System Roads (NFSR), or road sections, that are currently in " intermittent stored status": NFSR 17 - 2.5 miles; NFSR 17A - 1.1 miles; NFSR 17B, - 2.5 miles; NFSR 17C - 0.6 miles; and NFSR 17G - 0.5 miles; road NFSR 5049 – 1.0 miles;
- Install a portable/re-useable temporary bridge, approximately 70 feet in length, over Slippery Brook on NFSR 17A at the existing bridge crossing at approximate mile post 0.10 to provide access west of Slippery Brook;
- Install a second temporary bridge on NFSR 17A, approximately 24 feet in length over an unnamed brook at approximate mile post 0.25.;
- Construct 0.3 mile of new road off of NFSR 17A, at approximate mile post 0.6 , including relief drainage culverts and one temporary bridge, approximately 28 feet in length to access units 14-17, 22 and 25;
- Install a temporary bridge, approximately 24 feet in length, at an existing crossing on road NFSR 5049 at approximatley mile post 0.75 adjacent to unit 28;
- Remove all temporary drainage structures and bridges following closure of this project;
- Seed and close all opened roads to vehicular traffic when the project is complete. All opened roads shall be returned to closed intermittent status;
- Remove the old existing temporary bridge across Slippery Brook at the end of NFSR 17 near unit 9.
- Create up to ten acres in wildlife openings in three locations shown on the maps, where landings and proposed harvest units exist. Wildlife openings would be placed within proposed units 2 and 24, adjacent to a landing to be used, and adjacent to two other existing landings on FR 17C (see Map). These openings will be maintained every three to five years with mowing and/or prescribed burning.

Alternative 3 would harvest approximately 2.5 MMBF of timber from 380 acres of National Forest lands. This alternative would enhance softwood habitat through approximately 56 acres of single-tree selection and 35 acres of thinning, increase early successional habitat by creating approximately 52 acres of hardwood regeneration through clearcutting, and improve timber quality and species composition in hardwood and mixedwood stands through approximately 237 acres of single tree selection. Proposed operating seasons would be summer, fall, and winter. Forest Road 17A would not be restored. The other proposed road restoration, temporary bridge use, bridge removal, seeding and road closures, and wildlife openings would remain part of this alternative.

Alternative 4 would diversify wildlife habitat in terms of successional communities and softwood development, harvesting approximately 5.0 MMBF of timber from approximately 927 acres of National Forest lands. This alternative would enhance softwood habitat through approximately 183 acres of single-tree selection and 35 acres of thinning, increase early successional habitat by creating approximately 121 acres of hardwood regeneration through clearcutting, and improve timber quality and species composition in hardwood and mixedwood stands through approximately 413 acres of single tree selection and 175 acres of commercial thinning. Proposed operating seasons would be summer, fall, and winter. Road reconstruction, new construction and the other connected actions are the same as in the Proposed Action.

Chandler Round Vegetation Management EA Summary

Document Summary

The Saco Ranger District of the White Mountain National Forest is proposing the following management activities under the Proposed Action or Alternatives in the Chandler Round Project:

- Even-aged and uneven-aged timber management on up to 976 acres
- Pre-haul maintenance on up to approximately 8.2 miles of existing road
- Construct 0.3 miles of new low standard three season road

Chandler Round Project is located in the Towns of Chatham and Jackson, Carroll County, New Hampshire, on the Saco Ranger District of the White Mountain National Forest. Slippery Brook is the primary drainage for the project area. McDonough Brook and other small unnamed tributaries are included in the project area. Chandler Round analysis area contains approximately 8375 acres in HMU 505, and includes management actions within Management Area 3.1.

The following list describes the "need for change" and opportunities identified for the Chandler Round project area that would implement the White Mountain National Forest Plan.

1. There is a need to increase the acres of early successional habitat.
2. There is a need to increase the softwood component in some stands.
3. There is a need to create a more desireable stocking of species, size, and quality hardwood trees, while providing forest products.
4. There is a need to remove a defunct bridge located at the end of Forest road 17 due to safety and resource concerns.

The proposed action or Alternatives may result in the following effects:

- Temporary displacement or restriction of use on the Switchback Snowmobile trail
- Short-term localized sedimentation may occur at temporary stream crossings
- Temporary openings with new regeneration in clearcuts and group selection openings
- Release of existing advanced regeneration in single tree selection units and within group selection openings
- A reduction of up to 200 acres of mature forest where clearcutting occurs, resulting in creation of increased age-class diversity and the resultant benefits to wildlife dependent on this habitat
- An increase in the number of openings viewed from primary and nearby vantage points
- Road restoration which maintains but does not add to existing access; and for which existing road closures would remain
- Road restoration, skidding, and temporary bridge placement may result in minor, localized, and short-term direct and indirect effects to wildlife, and to water quality and water quantity
- Temporary displacement of some wildlife species during implementation
- Up to an estimated six million board feet of timber for harvest, manufacture, and marketing jobs, and an estimated $460,000 to the US Treasury, and up to $380,000 to the Towns of Chatham and Jackson, and the State of New Hampshire (Yield Taxes and 25% revenue fund)
- Improved health of treated forest stands, and increased value potential for future generations

- Up to ten acres of permanent wildlife openings, providing additional habitat diversity

This environmental assessment will provide the deciding officer (Saco District Ranger) with information to make informed decisions on the Chandler Round Vegetation Management Project and provides the basis for determining:

- Which alternative best meets the purpose and need to move the Chandler Round project area towards the desired condition in accordance with Forest Plan direction, addresses the need for change, and responds to the identified issues
- Whether the information in the analysis is sufficient to implement the Proposed Action or one of the alternatives
- If the proposed project has a significant impact on the human environment that would trigger a need to prepare an Environmental Impact Statement
- Whether the proposed mitigation measures and monitoring requirements are sufficient to meet Forest Plan standards and guidelines for all resources
- Whether the decision and alternatives considered meet applicable federal, state, and local laws and policies, including consistency with the Forest Plan
- If a Forest Plan amendment is required prior to implementation of this project

This document is available in large print.

Contact the White Mountain National Forest Supervisor's Office 1-603-528-8721

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Chandler Round Vegetation Management EA
Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four chapters:

- ***Chapter 1 – Purpose and Need for Action:*** Chapter 1 includes information on the history of the project area, Forest Plan direction, the purpose and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal (Scoping), and lists the unresolved (40CFR1501.7) issues for the proposed action.

- ***Chapter 2 – Alternatives, including the Proposed Action***: Chapter 2 details the Proposed Action and alternatives to the proposed action that were considered to meet the purpose and need for the project. Included are a list of Alternatives Eliminated from Detailed Consideration, Mitigation Measures to be applied, and a table comparing the Alternatives.

- ***Chapter 3 – Affected Environment and Environmental Consequences:*** This chapter describes the environmental effects of implementing the proposed action and the other identified alternatives and is organized by resource area. Each section details:

1. The affected environment
2. Direct and indirect effects of the No Action and the action alternatives
3. Cumulative effect of the alternatives with past, present and known future actions.

- ***Chapter 4 – List of Preparers and Agencies Consulted:*** This section provides a list of people involved in the analysis and preparation of the environmental assessment including internal and external contacts.

Appendices of additional information including:

- Appendix A Species with Potential Viability Concerns
- Appendix B Scoping Comments and FS Responses
- Appendix C Harvest Methods
- Appendix D Mitigation Measures
- Appendix E Glossary
- Appendix F References and Literature Cited

Additional documentation may be found in the project planning record located at the Saco Ranger District Office in Conway, NH.

CHANDLER ROUND PROJECT ENVIRONMENTAL ASSESSMENT

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Chapter 1. Purpose and Need for Action

A. Introduction and Document Structure

The Forest Service has prepared this Environmental Assessment (EA) in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into five parts:

- Purpose and Need for Action: This section includes information on the history of the project proposal, the purpose and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- Alternatives including the Proposed Action: This section provides a more detailed description of the agency's proposed action and alternatives for achieving the stated purpose. These alternatives were developed based on issues raised by the public and other agencies. The discussion also includes identification of mitigation measures and a summary table of the environmental consequences associated with each alternative.
- Environmental Consequences: This section describes the environmental effects of implementing the proposed action and other alternatives. Each resource is described, followed by the effects of the No Action Alternative, which provides a baseline for evaluation and comparison of the other alternatives that follow.
- Agencies and Persons Consulted: This section provides a list of agencies and persons consulted during the development of the environmental assessment.
- Appendices: The appendices provide more detailed information to support the analysis presented in the environmental assessment.

Additional documentation including detailed analyses of analysis area resources may be found in the project planning record located at the Saco Ranger District Office in Conway, New Hampshire.

The **Analysis Area** for the Chandler Round Project contains approximately 8375 acres of National Forest land within HMU 505. Of this, approximately 5,691 acres of Management Area (MA) 3.1 are included in the analysis area. MA 3.1 prescribes vegetation management to achieve the goals and objectives of the White Mountain National Forest Land and Resource Management Plan (LRMP, 1986). The **Project Area** is the portion of the Analysis Area that includes stands proposed for vegetative management, as well as the area associated with connected actions (roads and landings). The Project Area for the Proposed Action is

982 acres of National Forest lands proposed for harvest located in the towns of Chatham and Jackson, Carroll County, New Hampshire, on the Saco Ranger District of the White Mountain National Forest.

B. Background

Slippery Brook is the primary drainage for the project area. McDonough Brook and other small unnamed tributaries are included in the analysis area for water.

The project area contains MAs 3.1, 6.1, and 6.2.

Timber management activities led to construction of the existing road system within and surrounding the project area beginning in the mid 1900's. There is no evidence of old railroad logging, however, horse and oxen logging likely occurred prior to the establishment of the White Mountain National Forest. Indistinct and distinct evidence of past logging including truck roads and skid roads, can be observed throughout much of the project area. These old logging and skidding roads extend into and beyond areas proposed for treatment in this project.

C. Description of Chandler Round Project Area

The project is located primarily in the Town of Chatham, with one unit lying in Jackson, both in Carroll County, New Hampshire. The project area lies south of South Baldface, east of Sable and Chandler Mountains, north of Mountain Pond, and west of Slope and Eastman Mountains. Proposed harvest units are below 2400 feet in elevation, with the majority of the units at an elevation avveraging 1800 feet in elevation (see Figure 1, Chandler Round Project Location Map and Figure 2, Chandler Round Project Vicinity Map).

Management Areas within the analysis area and their approximate acreages are as follows:

(a) MA 3.1 - Multiple-Use Forest, Higher Intensity of Management, 5,691 acres;

(b) MA 6.1 - Semi-Primitive Non-Motorized Recreation, 1,765 acres;

(c) MA 6.2 - Semi-Primitive Non-Motorized Recreation, 790 acres;

The proposed action (treatment area) is entirely within Management Area 3.1. Applicable Forest Plan goals and objectives for MA 3.1 for this project are:

(a) Provide high quality hardwood sawtimber on a sustained yield basis and other timber products through intensive timber management practices; and (b) Increase wildlife habitat diversity for the full range of wildlife species with emphasis on early successional species;

The primary access to the project area is a National Forest System Road (NFSR) 17, also known as Slippery Brook Road. This road begins at State Highway 16 and 302 in Intervale, NH, and is locally known as Town Hall Road. It is open from after mud season until snow prevents vehicular traffic, at which time it is gated at Burnt Knoll Brook. Several existing closed roads join NFSR 17 along its length, including NFSR 38, East Branch Road. Slippery Brook hiking trail, East Branch hiking trail, Mountain Pond hiking trail and Switchback snowmobile trail are accessed from NFSR 17. Slippery Brook hiking trail and Switchback snowmobile trail are the only trails within the project area. Three hiking trailheads are provided, one at Mountain Pond, one for Slippery Brook Trail, and a winter parking site at Burnt Knoll Brook, where snow plowing terminates. Switchback snowmobile trail utilizes about three miles of Slippery Brook Road during the winter. Some cross-country skiers and

others on snowshoes use this road also for day trips.

D. White Mountain Land and Resource Management Plan - Final Environmental Impact Statement and Record of Decision, Amended (USDA, 1986, FEIS)

The White Mountain National Forest (WMNF) has prepared this Environmental Assessment (EA) in accordance with the White Mountain National Forest Land and Resource Management Plan Final Environmental Impact Statement and Record of Decision, as Amended (USDA, 1986 FEIS).

The Forest Plan is a programmatic document required by law that implements the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), as amended by the National Forest Management Act of 1976 (NFMA). The purpose of the Forest Plan is to provide direction for multiple use management and sustained yield of goods and services from National Forest lands in an environmentally sound manner.

The Forest Plan sets management direction for the White Mountain National Forest through the establishment of short term (10-15 years) and long-range (through the year 2036) goals and objectives. It prescribes the standards, practices, and the approximate timing and vicinity necessary to achieve these goals and objectives. The Forest Plan prescribes monitoring and evaluation needs necessary to ensure that direction is carried out, measures quality and quantity of actual operations against predicted outputs and effects, and forms the basis for implementing revisions.

In addition to allocating lands, the Forest Plan establishes a strategy to manage well-distributed and suitable wildlife habitat for maintaining viable populations of existing native and desired non-native vertebrate species. To provide the necessary habitat diversity for wildlife populations, the Forest Plan designated "Habitat Management Units" (HMUs) to distribute community types across the National Forest. Of the 780,000 acres comprising the White Mountain National Forest, approximately 345,000 acres are considered "suitable lands" where vegetative management is permitted through the use of commercial timber harvesting. Suitable lands are typically in lower elevations and include Management Areas 2.1 and 3.1 where timber management is used to maintain a variety of wildlife habitat conditions and generates timber products. Each HMU contains a substantial acreage of semi-primitive lands where no timber harvesting is allowed, and at least 4,000 acres of suitable lands in Management Areas 2.1 and/or 3.1. Semi-primitive lands include Management Areas 6.1 and 6.2, where non-motorized recreation is emphasized and timber harvest is either limited to salvage operations (6.1) or not permitted at all (6.2). Semi-primitive lands comprise nearly 410,000 acres of the Forest, providing a significant amount of mature and overmature wildlife habitat.

The Desired Future Condition (DFC) of an HMU is intended to provide a variety of habitat types and age classes (together defined as community types) that meet the life cycle needs for wildlife species inhabiting the National Forest (DeGraaf et al. 1992, DeGraaf and Yamasaki 2001). Examples of habitat types include "northern hardwood", "spruce-fir" and "paper birch". Age classes are based on stages of natural forest succession, ranging from the "regeneration" (0-9 years) phase of forest growth to the "overmature" (beyond the age when growth begins to decline) phase. Wildlife species that require or otherwise utilize "early-successional" openings will benefit from the availability of forest openings in the regeneration phase of growth. The same correlation is true for mature and overmature stands and for

those species that require or otherwise utilize "late-successional" vegetation. Early-successional vegetation is characterized most often by dense, ground level plant cover in areas open to direct sunlight. Late-successional vegetation is more typically characterized by large, mature woody vegetation with a closed canopy (foliage) that blocks sunlight from the ground. A more detailed explanation for how the distribution of habitat types and age classes determine where and when the White Mountain National Forest proposes to harvest timber can be found in Chapter 1, under Need for Change, and in Chapter 3 (**Section 3.2**, Vegetation, and **Section 3.9.1**, Wildlife Habitat).

NFMA states that Forest Plans "shall be revised from time to time when the Secretary finds conditions in a unit have significantly changed, but at least every 15 years" (16 U.S.C. 1604(f)(5)). However, Congress did not intend management to cease if the 15-year target date for plan revision was not met. NFMA, Section 1604 (c) illustrates this point. In the development of the original forest plans, Congress specifically allowed management of the forests to continue under existing resource plans pending approval of the first NFMA forest plan for each administrative unit. Section 321 of the Fiscal year 2003 Interior Appropriations Act included language that allowed National Forests to continue managing. The language states "Prior to October 1, 2003, the Secretary of Agriculture shall not be considered to be in violation of subparagraph 6(f)(5)(A) of the Forest and Rangeland Renewable Resources Planning Act of 1974 (16 U.S.C. 1604(f)(5)(A) solely because more than 15 years have passed without revision of the plan for a unit of the National Forest System."

A Notice of Intent to revise the Forest Plan was published February 14, 2000, and the revision process is underway. The Final Environmental Impact Statement is expected some time in the winter of 2004.

E. Purpose for the Action

The Purpose for this project is to accomplish resource objectives to meet the overall management direction for the White Mountain National Forest, as established in the Forest Plan (USDA 1986a. Forest Plan, III 30-41). The Forest Plan establishes the goals listed below for Management Area 3.1 within HMU 505. This proposal does not propose any harvest activities within MAs 6.1 and 6.2.

The goals for MA 3.1 applicable to this proposed action are:

- Provide large volumes of high quality hardwood sawtimber on a sustained yield basis and other timber products through intensive timber management practices
- *Increase wildlife habitat diversity for the full range of wildlife species with emphasis on early-successional species*
- Maintain the range of recreation options

F. Need for Change

The Forest Plan establishes a "Desired Future Condition" (DFC) for each Management Area. The need for change within a particular Management Area is determined by comparing the DFC with the existing condition (EC). For MA 3.1 lands within HMU 505, the Interdisciplinary Team identified the existing conditions, and then compared them to the DFC to determine where change was needed.

The interdisciplinary team of specialists considered many factors when monitoring forest conditions. Forest vegetative conditions change over time as trees mature, and thereby present opportunities in some areas to enhance overall conditions within these HMUs. The Chandler Round interdisciplinary team evaluated current conditions in HMU 505 during on-site visits and through analysis of vegetation databases and aerial photos. Observed vegetative conditions included ice storm damage and related disease and mortality, crown conditions, stand structure, age, and species diversity, overall stand health, and evidence of past management activities and current wildlife and human use. Field observations also included evidence of wildlife presence through observation of tracks, response calling for raptors, evaluation of road (access) and trail conditions, streamcourse (hydrologic) conditions, soil types and stability, recreation use levels, and landscape visual characteristics. Surveys for sensitive animal populations and for cultural and historic resources were completed. The culmination of these observations along with extensive public involvement and the application of Forest Plan guidance, indicates a need for carefully designed change specifically regarding vegetation within HMU 505.

Openings in the forest canopy introduce direct sunlight to the forest floor, encouraging the growth of "early-successional" plant species. These plant species thrive in sunlit conditions, and are typically the first to revegetate an area that was once but is no longer shaded. The conditions favoring plants that thrive on direct sunlight are referred to as "early-successional habitat". Some wildlife species need early-successional plant habitat to survive, while other wildlife species utilize a variety of habitats that includes the early-successional habitat. In either case, this habitat is a critical component of a landscape that supports a variety of wildlife. In establishing desired conditions for HMUs, the Forest Plan recognizes the need for early-successional habitat, and permits the use of commercial timber harvest to establish conditions favorable to this habitat in a limited number of acres. This includes harvest methods such as clearcuts, seed tree cuts or shelterwood cuts that remove most of the existing woody vegetation from a stand, and thus promote a component of regenerating and young growth within a larger landscape of mostly mature, closed canopy forest. This kind of "even-aged harvest" is typically

employed with those species and community types that regenerate best in early-successional conditions, such as paper birch, aspen and some hardwoods.

At the same time the Forest Plan prescribes even-aged timber harvest to promote early-successional wildlife habitat and vary stand structure, it prescribes an equal amount of uneven-aged timber harvest to promote the regeneration of those plants that thrive in shaded conditions. These plants typically grow best in the understory of a taller forest, often gaining a foothold where breaks in the canopy introduce a limited amount of sunlight to the forest floor. Uneven-aged harvest removes individual trees or small groups of trees to open pockets of sunlight. Where even-aged harvest maintains different structure from one stand to the next, with different species or communities often dominating from one stand to the next; uneven-aged harvest maintains structural variety within certain stands. Species and community types that regenerate best with uneven-aged harvest include spruce-fir, hemlock, and shade tolerant hardwoods such as sugar maple and beech.

Both even-aged and uneven-aged management harvest wood for forest products, while mimicking natural processes that would normally regenerate a forest. Even-aged harvest tends to mimic larger scale disturbance such as a severe wind storm, flooding, insect infestation, or wildfire. Uneven-aged stand management across a landscape mimics natural mortality of individual trees or clumps of trees from localized disturbance such as lightening, localized insect infestations, beaver activity and from natural disease and old age of dominant trees that occupy large crown positions. In the 2,788 acres (33%) of HMU 505 within MA 6.1 and 6.2 lands where natural processes such as small disturbances and individual tree mortality are the only means by which community types regenerate, species succession, stand structure changes, and regeneration processes are very gradual.

However, many of the stands in HMU 505 were severely affected by the 1998 ice storm, essentially causing mortality due to crown damage and partially opening the forest canopy on a large scale. These stands immediately began natural regeneration of shade tolerant species and crown recovery of residual standing trees that survived. Within HMU 505, the many affected stands maintained to a variety of degrees, their crown canopy and vertical structure. None of the stands were flattened or experienced complete mortality over their acerage. Several pockets of up to three or four acres were severely affected in several of the stands. While natural regeneration processes have occurred since 1998 these ice damaged stands do not represent early successional habitat.

Table 1 below displays the existing condition and desired condition for those opportunities where DFC can be achieved through vegetative management.

Table 1. Acres by Community Type in MA 3.1 for HMU 505

Community Type	Existing	Desired Future Condition	Need
Early-successional hardwood	72	422	350
Spruce/Fir	366	961	595
Permanent Wildlife Openings	2	82	80

Table 1 shows that to meet the habitat and stand structure objectives of the Forest Plan for HMU 505 there is a need to establish regenerating stands of aspen, paper birch and northern hardwoods; and

release understory and co-dominant spruce, fir and hemlock trees from competing hardwoods in mixedwood stands. Even-aged harvest methods can be used to convert some of the mature and overmature northern hardwood, aspen and paper birch stands to a regenerating age class (0-9 years). Uneven-aged harvest methods such as group selection or single tree selection is often used to increase representation of spruce and fir by removing hardwood overstory trees from a spruce/fir understory.

Harvesting mature and overmature trees would provide high quality sawtimber to area mills. Field reconnaissance revealed some hardwood and mixedwood stands whose overall health would benefit from thinning, group selection, or single-tree selection treatments. These treatments would increase residual stand growth and vigor, manage for a desireable range of species, produce forest products, and improve future sawtimber quality and productivity (see Forest Plan Appendices C1 and C3).

G. Proposed Action

The Saco Ranger District of the White Mountain National Forest proposes to manage forest vegetation to increase wildlife habitat diversity within the Chandler Round Project area through use of a commercial timber harvest.

The Proposed Action is designed to fulfill the Purpose and Need for Action in the analysis area, as described above, and to achieve the desired vegetative condition described in the Forest Plan. These goals include creating regeneration age habitat, increasing softwood development, increasing red oak reproduction, and providing high quality hardwood sawtimber and other forest products on a sustained yield basis.

National Forest System Roads to be used in the proposed action include NFSR 17A, 17B, 17C, 17G, and 5049. These roads are currently closed to vehicular traffic and are currently in “intermittent stored” status, essentially meaning they are closed and not maintained until their next use period. They were constructed in conjunction with past timber sales and have historically been used for timber hauling. These roads would be re-opened and restored to the design standards they were originally designed for, and returned to closed, intermittent stored status following use under this project.

NFSR 17 and NFSR 38 remain open during summer and fall for vehicular traffic and are gated or blocked near the terminus of the maintained portion. NFSR 17 is gated at Burnt Knoll Brook during the winter and spring where town plowing ends.

The temporary bridge crossing to the west side of Slippery Brook on NFSR 17A, just northeast of Mountain Pond, was removed following the previous harvest activity on the Slippery Brook Salvage sale, completed in approximately 1985. A temporary bridge would need to be placed at this crossing for this project. Maintenance on all of the permanent systsm roads to be used in this project would be needed to prevent deterioration of the road surface and road drainage ditches.

The analysis area is within HMU (Habitat Management Unit) 505 (See Figure 1, Chandler Round Project Area Location Map and Figure 2, Chandler Round Project Area Vicinity Map).

The following Proposed Action is designed to respond to the Purpose and Need for action:

1. Promote desired vegetation and habitat conditions outlined in the Forest Plan, and produce forest products to benefit the local economy.

- Increase early successional habitat by creating up to 200 acres of hardwood regeneration habitat through clearcutting;
- Enhance softwood habitat through approximately 200 acres of group and single-tree selection harvests;
- Improve timber quality and improve species composition in hardwood and mixedwood stands through approximately 193 acres of commercial thinning and 343 acres of group and single-tree selection;

2. Provide suitable and safe access to the project area and manage National Forest lands, resources and facilities in accordance with the White Mountain National Forest Plan

- Restore to current design standards through pre-haul maintenance the following existing National Forest System Roads (NFSR), or road sections, that are currently in " intermittent stored status": NFSR 17 - 2.5 miles; NFSR 17A - 1.1 miles; NFSR 17B, - 2.5 miles; NFSR 17C - 0.6 miles; and NFSR 17G - 0.5 miles; road NFSR 5049 – 1.0 miles;
- Install a portable/re-useable temporary bridge, approximately 70 feet in length, over Slippery Brook on NFSR 17A at the existing bridge crossing at approximate mile post 0.10 to provide access west of Slippery Brook;
- Install a second temporary bridge on NFSR 17A, approximately 24 feet in length over an unnamed brook at approximate mile post 0.25.;
- Construct 0.3 mile of new road off of NFSR 17A, at approximate mile post 0.6 , including relief drainage culverts and one temporary bridge, approximately 28 feet in length to access units 14-17, 22 and 25 (see Map).
- Install a temporary bridge, approximately 24 feet in length, at an existing crossing on road NFSR 5049 at approximatley mile post 0.75 adjacent to unit 28;
- Remove all temporary drainage structures and bridges following closure of this project;
- Seed and close all opened roads to vehicular traffic when the project is complete. All opened roads shall be returned to closed intermittent status;
- Remove the old existing temporary bridge across Slippery Brook at the end of NFSR 17 near unit 9.

Connected Actions

Associated area improvement projects may include up to 200 acres of timber stand improvement such as precommercial thinning, or regeneration release following establishment of regeneration in treated areas. These activities would be performed if needed to assure that regeneration objectives in single tree selection prescription units are met. Desirable regenerating species would be released from overtopping beech if needed to foster diversity of species in the new developing stand.

Create up to ten acres in wildlife openings in three locations shown on the maps, where landings and proposed harvest units exist. Wildlife openings would be placed within proposed units 2 and 24, adjacent to a landing to be used, and adjacent to two other existing landings on FR 17C (see Map). These openings will be maintained every three to five years with mowing and/or prescribed burning.

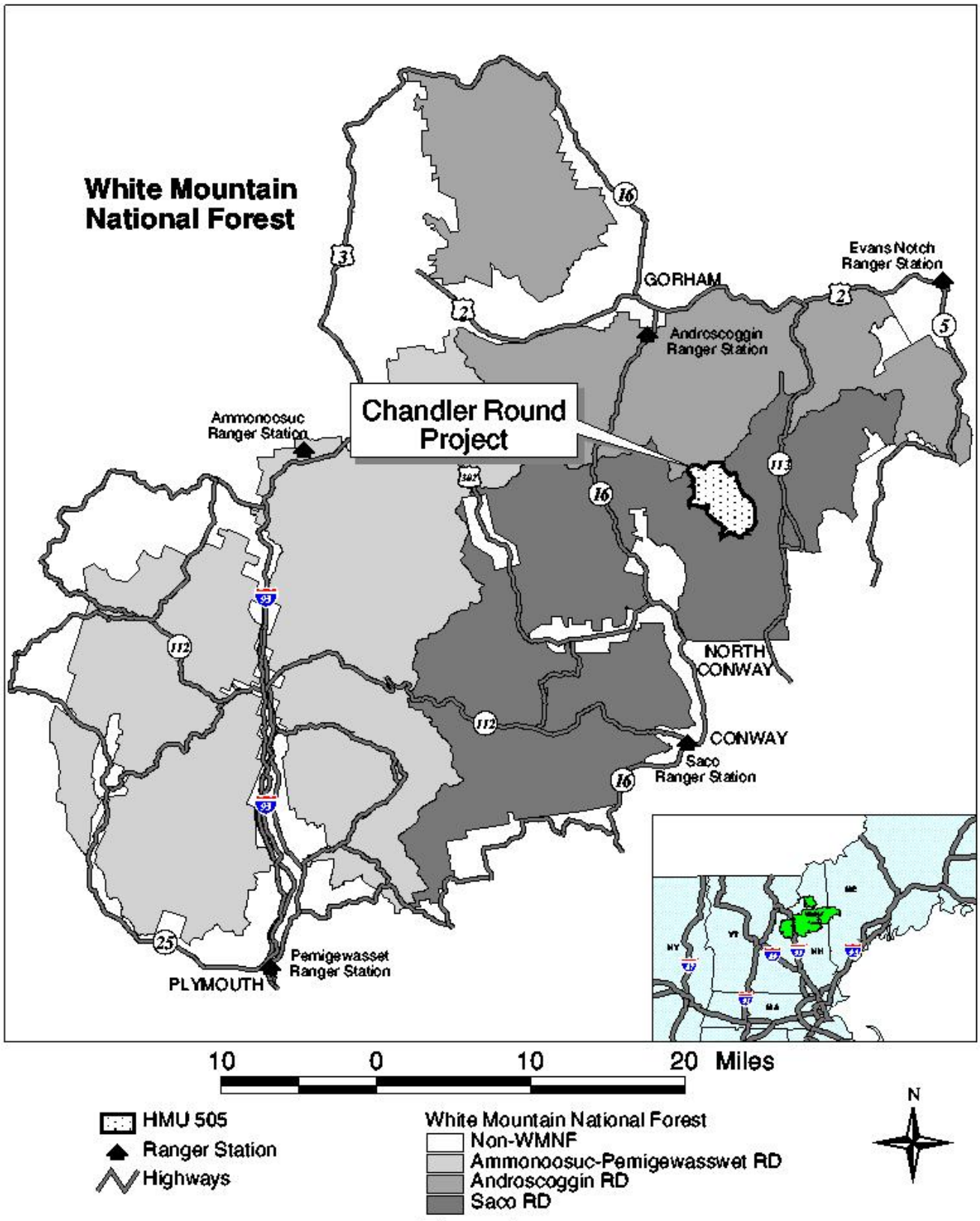

Figure 1:
Chandler Round Project Location

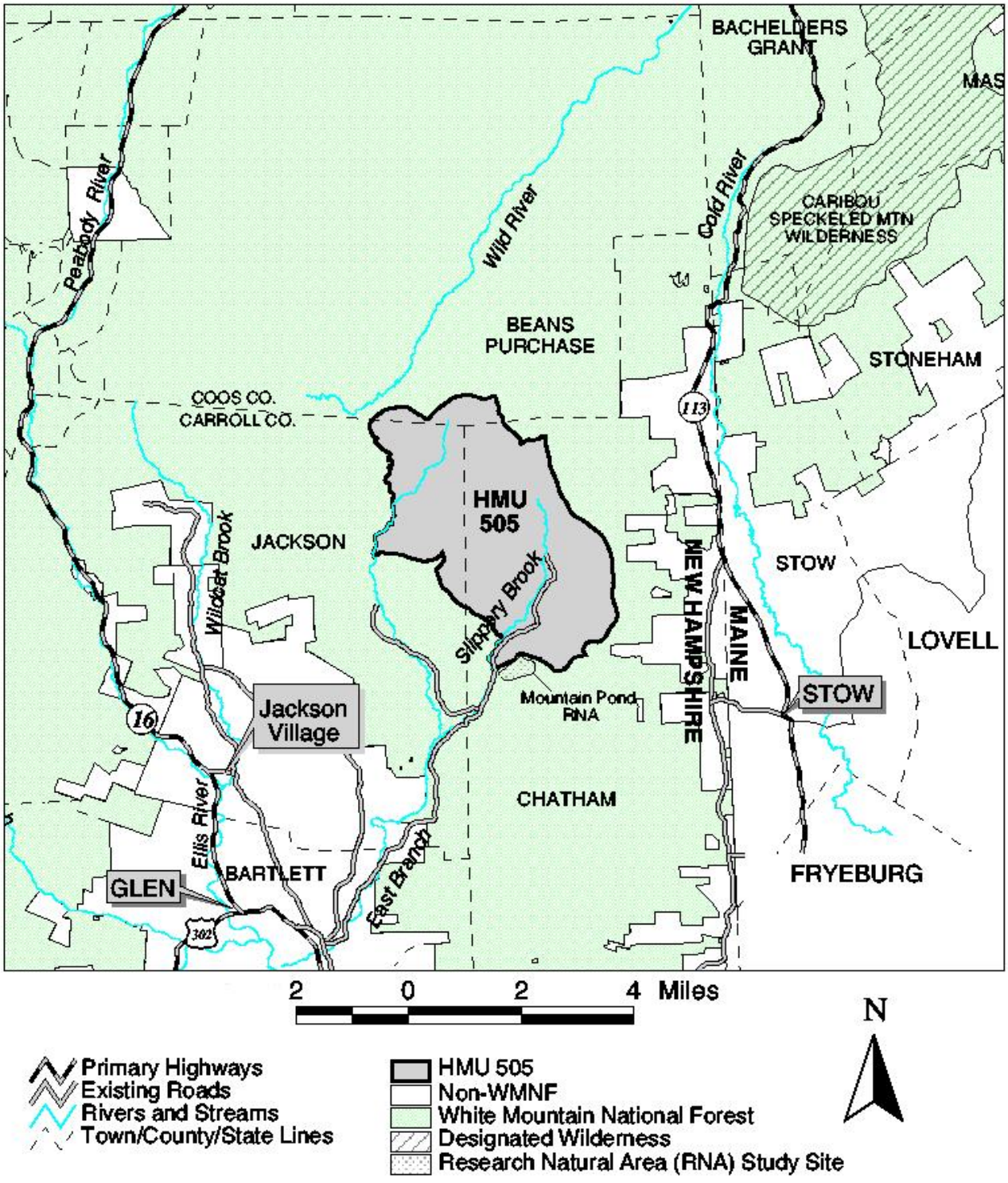

Figure 2:
Chandler Round Project Vicinity Map

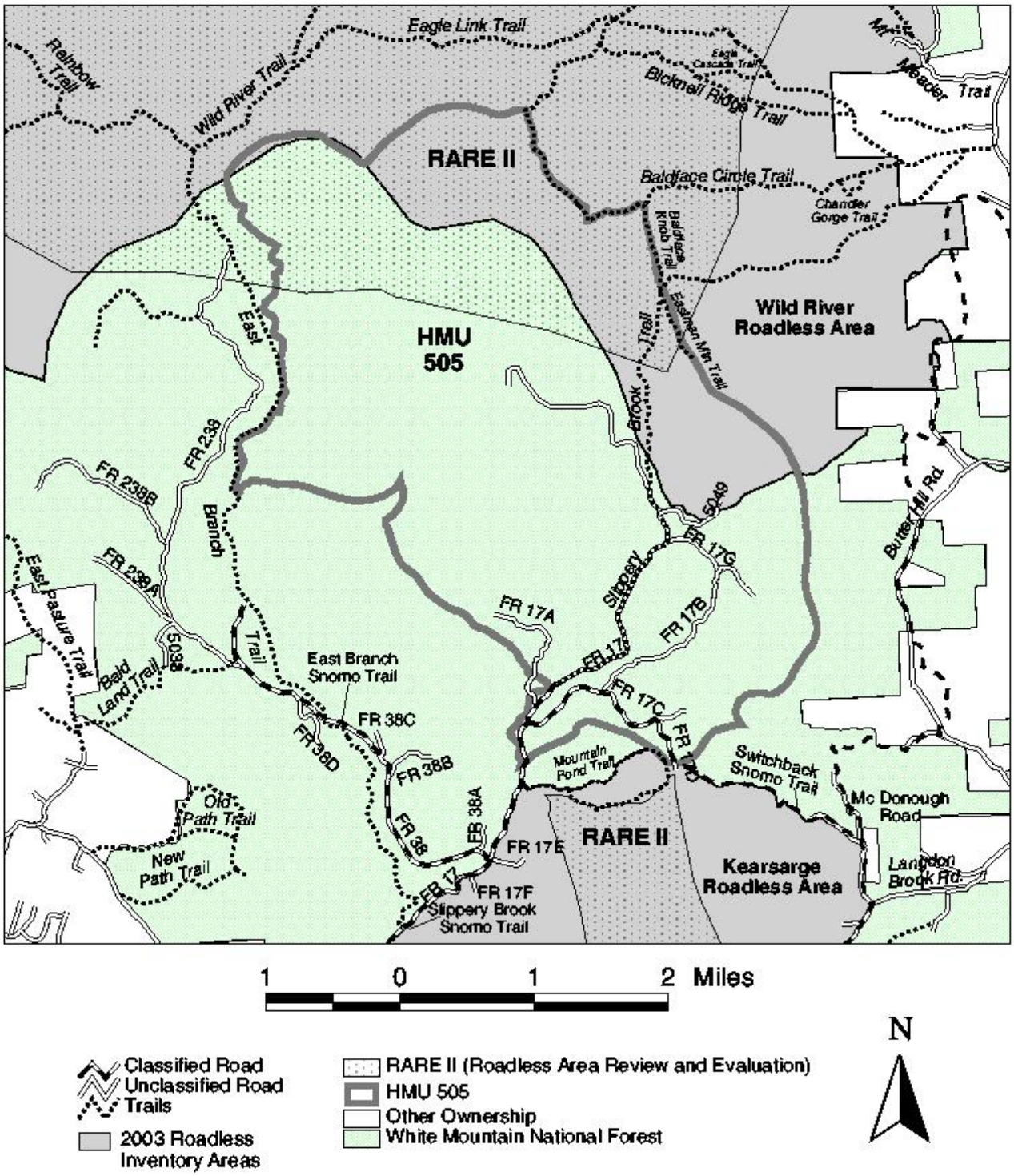

Figure 3:
Chandler Round Project Area
Roads and Trails

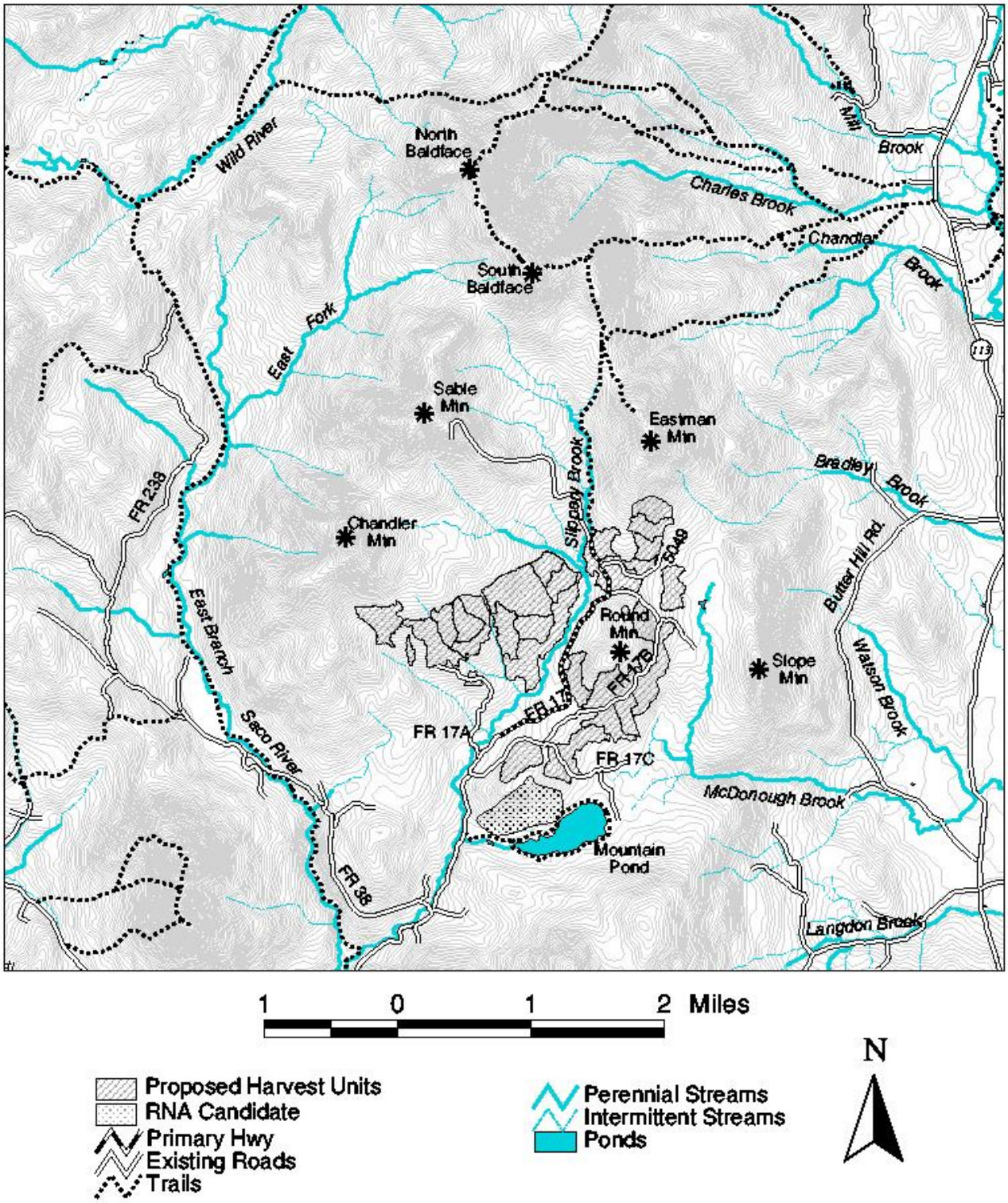

Figure 4:
Chandler Round Project Area Land Features

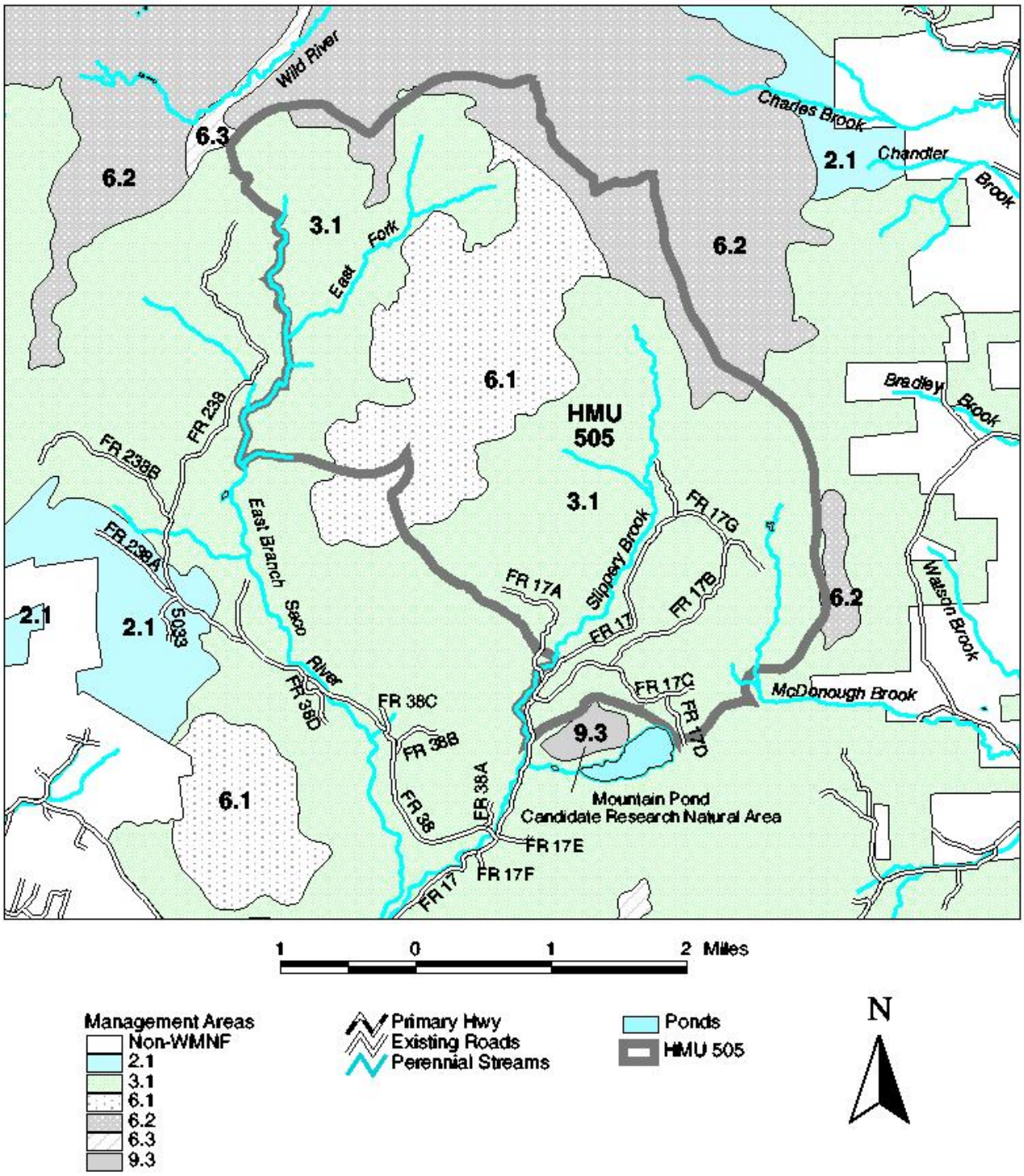

Figure 5:
Chandler Round Project Management Areas

H. Decision Framework

Considering the purpose and need for action, the deciding official, Saco District Ranger Terry Miller reviews the proposed action, the public comments, the issues and alternatives, the proposed mitigations, and the environmental effects in order to make decisions based on the following questions:

- Which alternative would best move the project area toward the DFC outlined in the Forest Plan and the Purpose and Need for Action?
- Which of the alternatives best addresses relevant issues raised by the public and the interdisciplinary team?
- Would the Proposed Action and its alternatives pose any significant environmental impact to warrant the need for an environmental impact statement?
- Does the decision and alternatives considered meet applicable federal, state, and local laws and policies, including consistency with the Forest Plan?
- Do the proposed mitigation measures meet Forest Plan Standards and Guidelines?

I. Public Involvement

On December 1, 2003 a scoping letter soliciting comments for the Chandler Round Project was sent to over a hundred individuals, organizations, and government agencies. An announcement of the Proposed Action was published in the *Conway Daily Sun*, the *Mountain Ear*, and the legal notices section of the **Manchester Union Leader**. The scoping letter was also posted on our White Mountain National Forest web page (www.fs.fed.us/r9/white). This project was also listed in the Quarterly Schedule of Proposed Actions for the White Mountain National Forest, which is mailed to over 500 people interested in White Mountain National Forest management activities.

Thirteen responses to the scoping letter were received. These responses have been used to aide in the development of alternatives, mitigation measures, and to define the analysis. Responses influenced project design including mitigations and development of alternatives such as location of activities (*where*), season of harvest (*when*), and silvicultural prescription (*what*).

J. Applicable Regulatory Requirements and Required Coordination

NFMA (National Forest Management Act)

NFMA gives direction for developing, maintaining and revising plans for individual units of the National Forest System. This includes direction for maintaining multiple use and sustained yield of forest products and services, insuring consideration of economic and environmental aspects of various systems of resource management, providing for diversity of plant and animal communities, and insuring that timber will be harvested only where suitable. As an example, the wildlife strategy developed in the 1986 White Mountain National Forest Plan provides the direction for managing for wildlife habitat diversity on the Forest. This document is *tiered to* the White Mountain National Forest Land and Resource Management Plan.

NEPA (National Environmental Policy Act)

NEPA gives direction to analyze and assess environmental conditions and consequences of planned and proposed actions. CEQ (Council on Environmental Quality) Regulations and the Forest Service Manual and Handbooks give direction and guidelines for conducting the analysis.

New Hampshire SHPO (State Historic Preservation Officer) Review

Before a decision is made for a project, State Historic Preservation Office (SHPO) reviews the cultural resource report for the project. We have received concurrence from SHPO on the cultural resource report and approval to implement the project with mitigations measures.

MBTA (Migratory Bird Treaty Act)

This project is consistent with the Migratory Bird Treaty Act. The White Mountain National Forest is actively involved with Partners in Flight program to protect neo-tropical migrants. The Forest also recently completed a Species Viability Evaluation (SVE) process to identify species that might have a potential viability concern on the Forest. Migratory birds were considered in this review. Any species identified through this process, including migratory birds, that have a viability concern are evaluated.

USFWS (United States Fish and Wildlife Service)

The USFWS will be asked to review the biological evaluation (BE) for federally listed threatened and endangered species (TES) prior to any decision.

This document *incorporates by reference* the following:

- Chandler Round Project BE (Biological Evaluation), 2004
- Annual Forest Monitoring Reports (1993 through 2000)
- Habitat and MIS Trend Analysis, Species Viability, and other literature cites in Appendix F
- USFS Management Indicator Species - Monitoring Report (2001)

K. Issues Used to Develop Alternatives

Issues are presented in two groups: "Issues Used to Develop Alternatives" and "Other Issues Brought Forward During Public Involvement." Issues Used to Develop Alternatives are typically used to develop site-specific alternatives. Measurement indicators were developed for these two issues and are a means of comparing the alternatives. "Other Issues Brought Forward During Public Involvement" are resolved through project design including mitigations, or are resolved at a higher level including 1) *outside the scope* of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. NEPA regulations require this delineation in Sec 1501.7, "… identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)".

The interdisciplinary team studied all the issues brought forward and identified the following **Issues Used to Develop Alternatives**. "Measurement Indicators" are identified for each issue and are used in Chapter 2, Section D for the Comparison of Alternatives table.

1. ***Effect that proposed harvesting and access for units on the west side of Slippery Brook and near Eastman Mountain might have on the suitability of this area for inclusion in a proposed Roadless Area (reference*** *2004 Roadless Area Inventory - Forest Plan Revision;* (**www.fs.fed.us/r9/white**).

This issue responds to the comment that activities should not be proposed in the area west of Slippery Brook and near Eastman Mountain until Forest Plan Revision is complete. This issue arises from concerns that harvesting, in particular clearcutting, and the proposed road activities might affect the character or size of the Wild River Roadless Area (WRRA) proposed in Forest Plan Revision.

Measurement Indicators:

- Percent of regeneration (clearcut, seedtree and shelterwood) cuts within the past ten years must be less than 20 percent of the WRRA
- National Forest System Roads must not exceed ½ mile per 1000 acres within the WRRA
- Cumulative percent of non-native tree plantations and permanent wildlife openings must be less than 15 percent within the WRRA
- A core area of solitude of at least 2,500 contiguous NF acres that is not impacted by motorized influences must exist for the area to be considered roadless.

2. ***Effect of clearcutting on scenery;***

Evidence of openings created during harvest activities may be apparent to individuals viewing the project area from South Baldface, Doublehead, Eastman, and Kearsarge Mountains, or from Mountain Pond or the Slippery Brook Trail.

Measurement Indicators:

- Acres (and percent) of early successional habitat (clearcuts) created within the HMU cumulatively within the last 10 years plus this action
- Acres of openings viewed from Eastman, Doublehead, Kearsarge, and Baldface Peaks, and from Mountain Pond
- Miles of hiking trail and snowmobile trail along which clearcutting would occur

L. Other Issues Brought Forward During Public Involvement

Following CEQ § 1500.4(c)(d) the following issues are incorporated into discussions in Chapter 3 under the related resource. The issues listed in this section are limited in extent, duration, and intensity and were not used to generate an alternative. The first section discloses issues that are resolved by project design including mitigations. The second section (M) discusses Other Issues Brought Forward During Public Involvement that are resolved at a higher level as listed under section K of this chapter. The public issues listed in this section are addressed in Appendix B, Scoping Comments and Responses.

Recreation

- *Winter use of Slippery Brook Road by logging trucks would close this road to snowmobiling*
- *Use of Slippery Brook Road (especially the Town Hall section) by logging trucks is a safety concern for residents*

- *Buffer zones along trails should maintain the integrity of these trails and minimize evidence of harvest activities*
- *Mountain Pond Research Natural Area should not be impacted by this action*
- *Can you prevent illegale use on the roads*

Vegetation Management

- *Whole tree harvesting and clearcutting could reduce soil nutrients and organic material, and combined with acid precipitation, could have a cumulative effect on soils*
- *Does the abundant new browse and natural openings resulting from the 1998 ice storm count as early successional habitat?*
- *Summer and fall logging may displace nesting birds and cause trunk damage to residual trees where winter logging is less likely to*
- *The proposed action does not propose enough clearcutting to meet the goals of the Forest Plan*
- *Use weed-free native seed for landings, temporary roads and skid road erosion control efforts to prevent introduction of non-native species*
- *Proposed and past harvests are cumulatively eliminating old trees and old forest conditions in lower elevations in this HMU*
- *Continued harvest may cause fragmentation of interior forest in this HMU*
- *Ice damaged trees that provide a necessary habitat function should not be removed for timber*
- *Sensitive plant populations and unique sites need to be avoided*

Streams and Water

- *What activities are compatible and what mitigations are necessary in riparian areas to limit adverse effects to water quality?*
- *Buffer zones along streams should maintain the integrity of these streams and minimize water quality impacts*
- *Clearcutting, road restoration, bridge construction and other harvesting may affect water quality and quantity*
- *Sedimentation or reduced water quality resulting from the proposed road and bridge activities may affect the wild trout fishery.*

Other

- *Will this project be offered as one sale or several sales?*
- *Are local companies usually successful on bidding on sales of this size?*
- *Does the Forest Service expect to complete this project in three years?*

M. Other Issues Brought Forward During Public Involvement that are Resolved at a Higher Level

- *The economics and environmental effects of much longer rotations should be considered.*
- *Hand thinning should be considered in some situations, creating more jobs and lower impact.*
- *Can the Forest Service guarantee revenue and what has been the return on other recent sales?*
- *The projects early successional habitat goals are too high, and should be based on natural conditions likely to have existed pre-settlement.*

Chapter 2 - Alternatives

A. Formulation of Alternatives

This chapter provides a detailed description of the Proposed Action and Alternatives to the Proposed Action. Alternative 1, referred to as the "No Action" alternative, proposes that no vegetative management activities be conducted within the Chandler Round Project Area. Consideration of a No Action alternative is required by regulations implementing the National Environmental Policy Act (NEPA), and is intended to contrast the effects of no action to the effects of action alternatives. Alternatives 2, 3 and 4 are referred to as "Action Alternatives", since each of these alternatives proposes some level of vegetative management activities within the Chandler Round Project Area. Alternative 2 is the "Original Proposed Action". This alternative was submitted to the public for comment in December 2003. Alternative 3 incorporates changes resulting from public comments regarding "Roadless" values on the west side of Slippery Brook and south of Eastman Mountain. Alternative 4 was developed in response to a public issue questioning the need for clearcutting and the effects clearcutting may have on visual quality and wildlife.

Alternatives 2 and 4 include providing temporary access via a temporary portable bridge to existing National Forest System Road 17A on the west side of Slippery Brook. Alternatives 1 and 3 do not provide access west of Slippery Brook, avoid treating stands there, and do not include a temporary bridge across Slippery Brook. Each of the Action Alternatives meets the Purpose and Need for Action, although there are differences in the degree to which each alternative moves this HMU towards the Desired Future Condition described in the Forest Plan.

The Proposed Action was designed to address the Purpose and Need for Action and began with a review of existing conditions for HMU 505. Compartment records were reviewed to identify stands that could benefit from silvicultural treatment. This data was verified through field reconnaissance. Site specific concerns related to other resources (such as soil, water, recreation, visuals and wildlife.) were identified and addressed either through project design, mitigation measures or deferring silvicultural treatment as appropriate. Alternative silvicultural treatments that would contribute towards the Desired Future Condition of the HMU were considered. From all of these considerations, the Original Proposed Action was developed and submitted to the public for comment (scoping) in December 2003.

The Purpose and Need section in Chapter 1 shows the desired outcome that each action alternative would need to respond to. Briefly, these are to move toward attaining the stated management goals for Management Area 3.1 as described in the Forest Plan.

Public input resulted in identification of two issues "used to formulate alternatives" and several "other issues brought forward during public involvement" as documented in Chapter 1.

The Forest Plan lists specific mitigation measures, called Standards and Guidelines, for controlling or alleviating the environmental effects of timber harvesting, road construction, and pre-haul maintenance. These Standards and Guidelines are required when conducting activities on the White Mountain National Forest and are incorporated by reference into this project design. Additional mitigation measures, which go above and beyond Forest Plan Standards and Guidelines, have also been developed

to address concerns specific to the Proposed Action and the alternatives. These site-specific measures, described in Appendix D, are intended to mitigate specific resource effects. They have been developed either as a result of ongoing research or as a result of monitoring and evaluation of similar actions on the White Mountain National Forest and elsewhere. Most information used to develop these additional mitigation measures has been accumulated over the past 15 years of implementing the Forest Plan.

B. Description of Alternatives

Alternative 1 - No Action Alternative

While this alternative does not meet the Purpose and Need for Action, it does provide a basis for analyzing the effects of conducting no vegetative management activities (No Action) in the Project Area, and comparing these effects with those alternatives that propose some level of vegetative management. This alternative is required by regulations implementing the National Environmental Policy Act (NEPA). This alternative would not harvest any trees, increase permanent wildlife openings, conduct any road restoration or new construction, amend the Forest Plan or implement any other connected actions. This alternative would not meet Forest Plan expectations for sustained timber products and diverse wildlife habitat in HMU 505 for the foreseeable future.

There would be no change to the existing condition of the area except from natural occurrences, ongoing recreation activities, and road and trail maintenance. This alternative provides a foundation for describing and comparing the magnitude of environmental changes associated with the Action Alternatives against those that occur naturally or during routine operations. This alternative responds to those who want no timber harvesting or active wildlife habitat management to take place. Choosing this alternative would not preclude proposing timber harvest in this area at a later date. The term "No-Action" means no management actions at this time.

Alternative 2 – Original Proposed Action

The Original Proposed Action and its connected actions were developed to optimize the Purpose and Need for Action with the most current information available at that time. It would move the HMU toward attaining wildlife habitat diversity objectives and other Forest Plan goals. These goals include creating early successional habitat, increasing softwood development, and providing for sustained timber production.

The Original Proposed Action is designed to respond to the Purpose and Need for action by:

1. Promote desired vegetation and habitat conditions outlined in the Forest Plan, and produce forest products to benefit the local economy.

- Increase early successional habitat by creating 200 acres of hardwood regeneration habitat through clearcutting;
- Enhance softwood habitat through approximately 200 acres of group and single-tree selection harvests and 35 acres of thinning;
- Improve timber quality and improve species composition in hardwood and mixedwood stands through approximately 162 acres of commercial thinning and 379 acres of group and single-tree selection;

2. Provide access to the planning area and manage National Forest lands and resources in accordance with the White Mountain National Forest Plan

- Restore to current design standards through pre-haul maintenance the following existing National Forest System Roads (NFSR), or road sections, that are currently in " intermittent stored status": NFSR 17 - 2.5 miles; NFSR 17A - 1.1 miles; NFSR 17B, - 2.5 miles; NFSR 17C - 0.6 miles; and NFSR 17G - 0.5 miles; road NFSR 5049 – 1.0 miles;
- Install a portable/re-useable temporary bridge, approximately 70 feet in length, over Slippery Brook on NFSR 17A at the existing bridge crossing at approximate mile post 0.10 to provide access west of Slippery Brook;
- Install a second temporary bridge on NFSR 17A, approximately 24 feet in length over an unnamed brook at approximate mile post 0.25.;
- Construct 0.3 mile of new road off of NFSR 17A, at approximate mile post 0.6 , including relief drainage culverts and one temporary bridge, approximately 28 feet in length to access units 14-17, 22 and 25 (see Map).
- Install a temporary bridge, approximately 24 feet in length, at an existing crossing on road NFSR 5049 at approximatley mile post 0.75 adjacent to unit 28;
- Remove all temporary drainage structures and bridges following closure of this project;
- Seed and close all opened roads to vehicular traffic when the project is complete. All opened roads shall be returned to closed intermittent status;
- Remove the old existing temporary bridge across Slippery Brook at the end of NFSR 17 near unit 9.

Connected Actions

- Create up to ten acres in wildlife openings to be placed adjacent to existing landings.
- Implement up to 200 acres of precommercial thinning or regeneration release following establishment of regeneration in treated areas.

Estimated Outputs

Alternative 2 would provide approximately 6.0 million board feet of sawtimber and pulpwood, and improve future stand quality and productivity.

This alternative responds to the need to create hardwood early successional habitat and to increase softwood component in mixedwood stands. Using clearcutting to accomplish the desired wildlife habitat composition (see Table 1), this alternative responds to the need to create early-successional habitat (forest stands 0-9 years old). Natural regeneration with paper birch, yellow birch, pin cherry, and aspen are expected in the clearcuts.

During harvest operations, trees would either be processed in the woods or at the landing site. Tops of trees processed in the woods would remain on the ground. The tops of trees processed at the landing would be scattered within units or used on skid trails to reduce soil impacts. An explanation of the harvest methods is found in Appendix C, Management Systems and Harvest Methods.

Table 2. Chandler Round Project Alternative 2 (Proposed Action)

Unit	Forest Type	Acre	Treatment Objective	Harvest Method	Operating Season
1	Mixedwood	40	Hardwood regeneration	Group Selection / STS	Summer/Fall/Winter
2	Hardwood	22	Hardwood regeneration	Clear Cut	Summer/Fall/Winter
3	Mixedwood	28	Softwood development	Group Selection / STS	Winter
4	Hardwood	24	Hardwood regeneration	Group Selection / STS	Fall/Winter
5	Hardwood	50	Hardwood regeneration	Group Selection / STS *	Fall/Winter
6	Mixedwood	28	Softwood development	Group Selection / STS*	Fall/Winter
7	Hardwood	30	Hardwood regeneration	Clear Cut	Summer/Fall/Winter
8	Mixedwood	21	Softwood development	Group Selection / STS*	Winter
9	Hardwood	21	Hardwood regeneration	Clear Cut	Summer/Fall/Winter
10	Mixedwood	35	Softwood development	Thin	Fall/Winter
11	Hardwood	24	Hardwood regeneration	Group Selection / STS	Summer/Fall/Winter
12	Hardwood	46	Quality hardwood	Thin	Fall/Winter
13	Hardwood	25	Hardwood regeneration	Group Selection / STS	Fall/Winter
14	Softwood	32	Softwood development	Group Selection / STS*	Fall/Winter
15	Hardwood	86	Quality hardwood	Thin	Winter
16	Hardwood	22	Quality hardwood	Thin	Fall/Winter
17	Mixedwood	85	Softwood development	Group Selection / STS*	Winter
18	Mixedwood	6	Softwood development	STS	Fall/Winter
19	Hardwood	40	Hardwood regeneration	Group Selection / STS	Fall/Winter
20	Hardwood	39	Hardwood regeneration	Group Selection / STS	Fall/Winter
21	Hardwood	8	Quality hardwood	Thin	Fall/Winter
22	Hardwood	30	Hardwood regeneration	Clear Cut	Summer/Fall/Winter
23	Hardwood	54	Hardwood regeneration	Group Selection / STS	Fall/Winter
24	Hardwood	38	Hardwood regeneration	Group Selection / STS	Winter
25	Hardwood	22	Hardwood regeneration	Clear Cut	Fall / Winter
26	Hardwood	26	Hardwood regeneration	Clear Cut	Summer/Fall/Winter
28	Hardwood	20	Hardwood regeneration	Clear Cut	Summer/Fall/Winter
29	Hardwood	14	Hardwood regeneration	Group Selection / STS *	Fall/Winter
30	Hardwood	29	Hardwood regeneration	Clear Cut	Summer/Fall/Winter
31	Hardwood	31	Hardwood regeneration	Group Selection / STS *	Fall/Winter
Sum		976			

* implies small groups averaging 1/4th acres.

STS= Single Tree Selection, an uneven age management system (see attachment for descriptions)

Forest Type – represents the primary species composition of the unit

Treatment objective –the harvest methods are designed to meet the Purpose and Need for treatment in each unit.

Harvest Method: the silvicultural prescription, or type of harvest proposed for a given unit.

Operating Season - Time of year when harvest activities are scheduled to occur. Activities may occasionally occur outside these periods when soil conditions and other resource considerations allow.

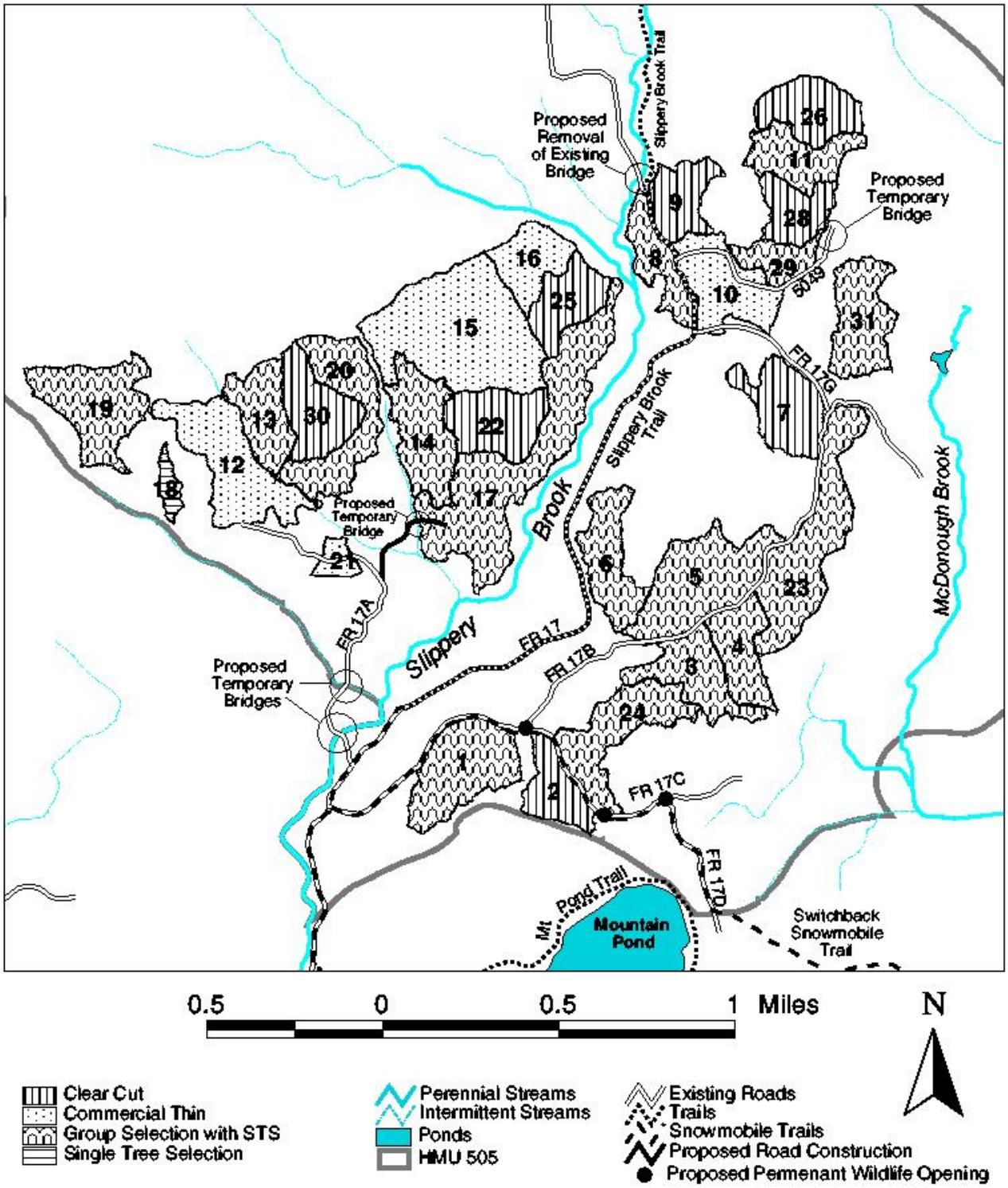

Figure 6 :
Chandler Round Project
Alternative 2 (Proposed Action)

Alternative 3

Alternative 3 was developed to address public issues about logging and road restoration west of Slippery Brook and north of the unnamed existing road by excluding treatment in these areas.

To a lesser degree than the Proposed Action, it would move the HMU toward attaining wildlife habitat diversity objectives and other Forest Plan goals. These goals include creating early successional habitat, increasing softwood development, and providing for sustained timber production.

Alternative 3 responds to the Purpose and Need for action by:

1. Promote desired vegetation and habitat conditions outlined in the Forest Plan, and produce forest products to benefit the local economy.

- Increase early successional habitat by creating up to 52 acres of hardwood regeneration habitat through clearcutting;
- Enhance softwood habitat through approximately 56 acres of group and single-tree selection harvests and 35 acres of thinning;
- Improve timber quality and improve species composition in hardwood stands through approximately 237 acres of group and single-tree selection

2. Provide access to the planning area and manage National Forest lands and resources in accordance with the White Mountain National Forest Plan

- Restore to current design standards through pre-haul maintenance activities, the following existing National Forest System Roads (NFSR), or road sections, that are currently in "stored, intermittent status": NFSR 17B, - 1.8 miles; NFSR 17C, - 0.6 miles; and NFSR 17G, - 0.5 miles;
- Remove all temporary drainage structures following closure of this project;
- Seed and close all opened roads to vehicular traffic when the project is complete. All opened roads shall be returned to closed, intermittent status;
- Remove the existing temporary bridge across Slippery Brook at the end of FR 17 near unit 9.
- Create up to ten acres in wildlife openings to be placed adjacent to existing landings.
- Implement up to 200 acres of precommercial thinning and release in treated areas.

Estimated Outputs

Alternative 3 would provide approximately 2.5 million board feet of sawtimber and pulpwood, and improve future stand quality and productivity.

This alternative responds to the need to create hardwood early successional habitat and to increase softwood component in mixedwood stands. Using clearcutting to accomplish the desired wildlife habitat composition on 52 acres (see Table 3), this alternative responds to the need to create early-successional habitat (forest stands 0-9 years old). Natural regeneration with paper birch, yellow birch, pin cherry, and aspen are expected in the clearcuts.

Using single-tree selection and thinning, this alternative responds to the need to increase the softwood component in softwood stands on 91 acres. Single-tree selection in hardwood stands would reduce stand density while maintaining an uneven-aged stand structure.

Table 3. Chandler Round Project Alternative 3

Unit	Forest Type	Acre	Treatment Objective	Harvest Method	Operating Season
1	Mixedwood	40	Hardwood regeneration	Group Selection / STS	Summer/Fall/Winter
2	Hardwood	22	Hardwood regeneration	Clear Cut	Summer/Fall/Winter
3	Mixedwood	28	Softwood development	Group Selection / STS	Winter
4	Hardwood	24	Hardwood regeneration	Group Selection / STS	Fall/Winter
5	Hardwood	50	Hardwood regeneration	Group Selection / STS *	Fall/Winter
6	Mixedwood	28	Softwood development	Group Selection / STS*	Fall/Winter
7	Hardwood	30	Hardwood regeneration	Clear Cut	Summer/Fall/Winter
10	Mixedwood	35	Softwood development	Thin	Fall/Winter
23	Hardwood	54	Hardwood regeneration	Group Selection / STS	Fall/Winter
24	Hardwood	38	Hardwood regeneration	Group Selection / STS	Winter
31	Hardwood	31	Hardwood regeneration	Group Selection / STS *	Fall/Winter
Sum		380			

* implies small groups averaging 1/4th acres.

STS = Single Tree Selection, an uneven age management system (see attachment for descriptions)

Forest Type = represents the primary species composition of the unit

Treatment objective = the harvest method designed to meet the Purpose and Need in each unit.

Harvest Method = the silvicultural prescription, or type of harvest proposed for a given unit.

Operating Season = Time of year when harvest activities are scheduled to occur. Activities may occasionally occur outside these periods when soil conditions and other resource considerations allow.

Bridge Crossing Site, NFSR 17A, where the temporary bridge would be located, Slippery Brook, 2003

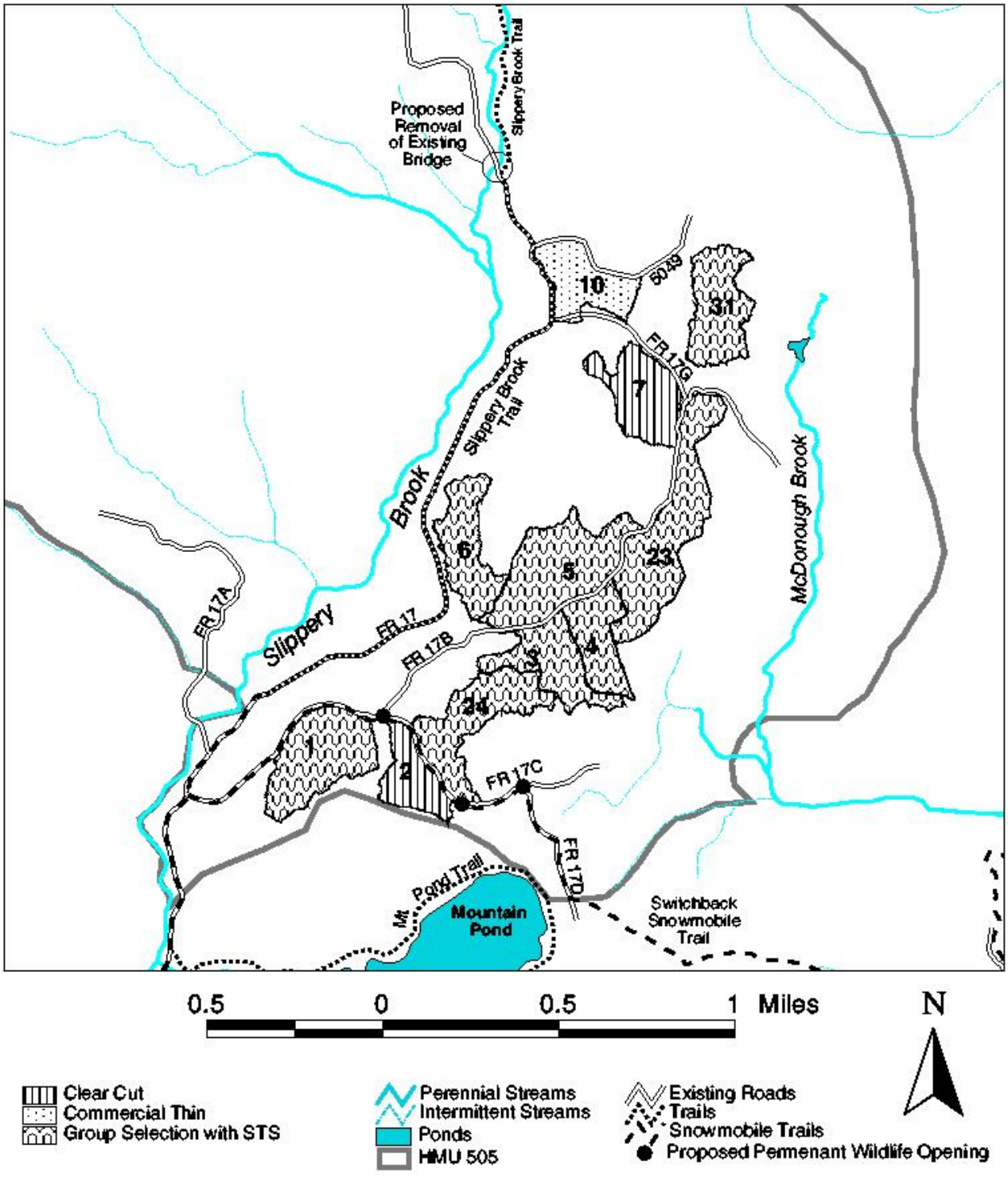

Figure 7 :
Chandler Round Project
Alternative 3

Alternative 4

Alternative 4 was developed to address public issues about clearcutting. It reduces the size of three clearcuts by applying group selection or thinning treatments to a portion of the unit. It omits four areas from treatment and changes two clearcuts in their entirety, one to group selection and one to a thin.

It would move the HMU toward attaining wildlife habitat diversity objectives and other Forest Plan goals. These goals include creating early successional habitat, increasing softwood development, and providing for sustained timber production.

Alternative 4 responds to the Purpose and Need for action by:

1. Promote desired vegetation and habitat conditions outlined in the Forest Plan, and produce forest products to benefit the local economy.

- Increase early successional habitat by creating 121 acres of hardwood regeneration habitat through clearcutting;
- Enhance softwood habitat through approximately 183 acres of group and single-tree selection harvests and 35 acres of thinning;
- Improve timber quality and improve species composition in hardwood and mixedwood stands through approximately 175 acres of commercial thinning and 413 acres of group and single-tree selection;

2. Provide access to the planning area and manage National Forest lands and resources in accordance with the White Mountain National Forest Plan

- Restore to current design standards through pre-haul maintenance the following existing National Forest System Roads (NFSR), or road sections, that are currently in " intermittent stored status": NFSR 17 - 2.5 miles; NFSR 17A - 1.1 miles; NFSR 17B, - 2.5 miles; NFSR 17C - 0.6 miles; and NFSR 17G - 0.5 miles; road NFSR 5049 – 1.0 miles;
- Install a portable/re-useable temporary bridge, approximately 70 feet in length, over Slippery Brook on NFSR 17A at the existing bridge crossing at approximate mile post 0.10 to provide access west of Slippery Brook;
- Install a second temporary bridge on NFSR 17A, approximately 24 feet in length over an unnamed brook at approximate mile post 0.25.;
- Construct 0.3 mile of new road off of NFSR 17A, at approximate mile post 0.6 , including relief drainage culverts and one temporary bridge, approximately 28 feet in length to access units 14-17, 22 and 25 (see Map).
- Install a temporary bridge, approximately 24 feet in length, at an existing crossing on road NFSR 5049 at approximatley mile post 0.75 adjacent to unit 28;
- Remove all temporary drainage structures and bridges following closure of this project;
- Seed and close all opened roads to vehicular traffic when the project is complete. All opened roads shall be returned to closed intermittent status;
- Remove the old existing temporary bridge across Slippery Brook at the end of NFSR 17 near unit 9.
- Create up to ten acres in wildlife openings to be placed adjacent to existing landings.
- Implement up to 200 acres of precommercial thinning and release in treated areas.

Estimated Outputs

Alternative 4 would provide approximately 5.0 million board feet of sawtimber and pulpwood, and improve future stand quality and productivity. This alternative responds to the need to create hardwood early successional habitat and to increase softwood component in mixedwood stands (see Table 4). Natural regeneration of paper birch, yellow birch, pin cherry, and aspen are expected in clearcuts.

This alternative responds to the need to increase the softwood component in mixedwood and hardwood stands in this HMU by removing dominant competing hardwoods while maintaining an uneven-aged stand structure and thereby increase the softwood component. Regeneration within single tree selection units (uneven aged) is expected to increase the diversity of tree age, species, and tree size (structure) in treated stands.

Commercial thinning would reduce stand densities, improve species composition, and retain the most vigorous trees. Tree tops would be scattered in harvested areas or used on skid trails to reduce soil impacts. An explanation of the harvest methods is found in Appendix C, Management Systems and Harvest Methods.

Typical Section of upper Slippery Brook.

This picture shows a section adjacent to the south end of harvest unit 17.

Table 4. Chandler Round Project Alternative 4

Unit	Forest Type	Acre	Treatment Objective	Harvest Method	Operating Season
1	Mixedwood	40	Hardwood regeneration	Group Selection / STS	Summer/Fall/Winter
2	Hardwood	22	Hardwood regeneration	Clear Cut	Summer/Fall/Winter
3	Mixedwood	28	Softwood development	Group Selection / STS	Winter
4	Hardwood	24	Hardwood regeneration	Group Selection / STS	Fall/Winter
5	Hardwood	50	Hardwood regeneration	Group Selection / STS *	Fall/Winter
6	Mixedwood	28	Softwood development	Group Selection / STS*	Fall/Winter
7	Hardwood	30	Hardwood regeneration	Clear Cut	Summer/Fall/Winter
9	Hardwood	21	Quality Hardwood	Thin	Fall/Winter
10	Mixedwood	35	Softwood development	Thin	Fall/Winter
11	Hardwood	24	Hardwood regeneration	Group Selection / STS	Summer/Fall/Winter
12	Hardwood	46	Quality hardwood	Thin	Fall/Winter
13	Hardwood	25	Hardwood regeneration	Group Selection / STS	Fall/Winter
14	Softwood	32	Softwood development	Group Selection / STS*	Fall/Winter
15	Hardwood	86	Quality hardwood	Thin	Winter
16	Hardwood	22	Quality hardwood	Thin	Fall/Winter
17	Mixedwood	95	Softwood development	Group Selection / STS*	Winter
19	Hardwood	40	Hardwood regeneration	Group Selection / STS	Fall/Winter
20	Hardwood	53	Hardwood regeneration	Group Selection / STS	Fall/Winter
22	Hardwood	30	Hardwood regeneration	Clear Cut	Summer/Fall/Winter
23	Hardwood	54	Hardwood regeneration	Group Selection / STS	Fall/Winter
24	Hardwood	38	Hardwood regeneration	Group Selection / STS	Winter
25	Hardwood	12	Hardwood regeneration	Clear Cut	Fall/Winter
26	Hardwood	12	Hardwood regeneration	Clear Cut	Summer/Fall/Winter
28	Hardwood	20	Hardwood regeneration	Group Selection/STS	Summer/Fall/Winter
29	Hardwood	14	Hardwood regeneration	Group Selection / STS *	Fall/Winter
30	Hardwood	15	Hardwood regeneration	Clear Cut	Summer/Fall/Winter
31	Hardwood	31	Hardwood regeneration	Group Selection / STS *	Fall/Winter
Sum		927			

* implies small groups averaging 1/4th acres.

STS= Single Tree Selection, an uneven age management system (see attachment for descriptions)

Forest Type = represents the primary species composition of the unit

Treatment objective = the harvest methods are designed to meet the Purpose and Need for treatment in each unit.

Harvest Method = the silvicultural prescription, or type of harvest proposed for a given unit.

Operating Season = Time of year when harvest activities are scheduled to occur. Activities may occasionally occur outside these periods when soil conditions and other resource considerations allow.

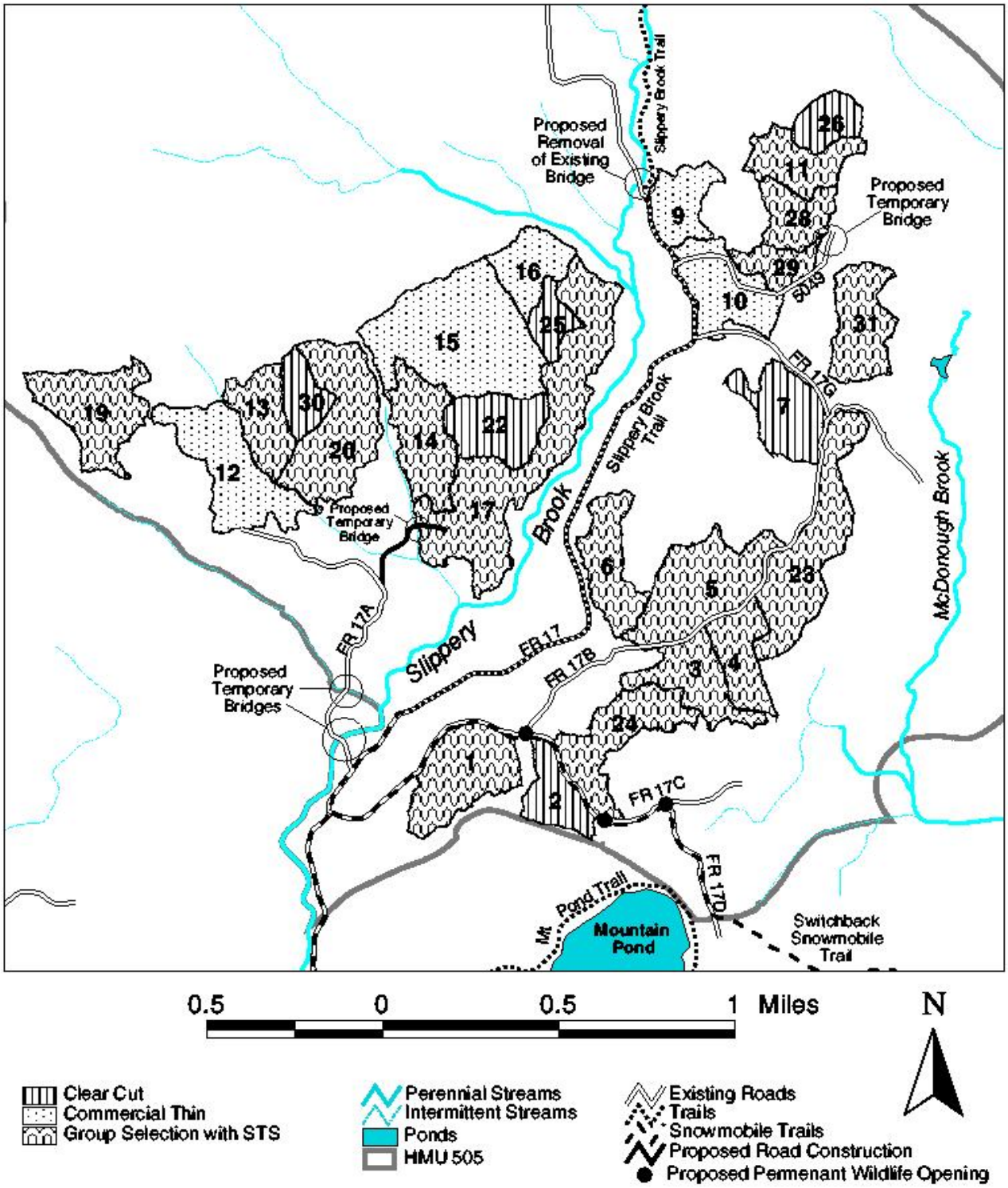

Figure 8 :
Chandler Round Project
Alternative 4

Connected Projects under ALL of the Action Alternatives

Approximately nine existing landings would be used and two new landings would be needed. In Alternative 3, eight existing landings and one new landing would be needed. A log landing is approximately one quarter to one acre in size where harvested trees are decked for loading onto log trucks and then transported to various mills. These existing landings sum to about nine acres. Each (of two) new landings would be approximately one acre in size.

Pre-haul maintenance is the routine work done by a timber sale purchaser to make an existing road ready for hauling and may include removing vegetation from road surfaces, cleaning or installing ditches and culverts, removal of encroaching vegetation, and grading road surfaces. Pre-haul road maintenance would be required on NFSR's 17 (the intermittant portion), 17A, 17B, 17C, and 17G as stated in the alternative descriptions. Alternative 3 would not open Forest Road 17A or place a temporary bridge across Slippery Brook. Road maintenance would be designed to allow for haul on frozen or dry road surface conditions.

Up to 200 acres of timber stand improvement projects such as precommercial thinning, or regeneration release in single tree selection units may be needed. These activities would be performed to assure that regeneration objectives in single tree selection units are met. Desirable regenerating species would be released from overtopping beech if needed to foster diversity of species in the new developing stand.

Ten acres of permanent wildlife openings are proposed in three locations along Forest Road 17C. Once established, these permanent wildlife openings would be maintained every 3-5 years, either by mowing with a tractor or by prescribed burning. For mowing, openings would first have stumps removed, and then be seeded with winter rye to minimize soil movement as natural herbaceous plants become re-established. Mowing would occur between August and November when site conditions are dry. Prescribed burning would in late spring or early fall during appropriate weather conditions.

C. Alternatives Considered and Eliminated from Detailed Study

- ***Analyze an alternative that proposes only uneven-aged management.*** This alternative was considered and deleted from further study because it does not meet an important component of the Purpose and Need for the proposed action as directed in the White Mountain National Forest Plan. One of the goals for MA 3.1 lands is to provide a balanced mix of habitats for all wildlife species. The Purpose and Need for Action for this project specifically includes creation of early successional habitat. A detailed discussion regarding the need for early successional habitat is presented in the Need for Action and Need for Change sections of Chapter 1. The Wildlife effects section in Chapter 3 discusses effects of the No Action Alternative and the anticipated outcomes on habitat diversity that the proposed even-aged management (clearcuts primarily) and the uneven-aged treatments would have. An alternative that would have implemented only un-even aged treatments was evaluated. Early successional habitat is particularly absent in the vicinity of proposed units west of Slippery Brook and demonstrates a need for this type of habitat. Harvest treatments in that area cut in the early 1980's are well-stocked hardwood pole sized stands exceeding (in most cases) twenty-five feet in height. This identifiable need of action within the project area eliminated this alternative from further detailed study.

- ***Access the project area from the East Branch road (NFSR 38) to avoid using the existing bridge crossing site on Slippery Brook. Potential access routes were identified and evaluated.*** Access via NFSR 38b would require 1.2 miles of new road construction to cross northeasterly and connect to road 17A near the bridge site. A second potential route that would ascend the west side of Slippery Brook by extending Forest road 38a would require approximately 1.5 miles of new road construction. A third route leaves Slippery Brook Trail (Forest road 17A) and would improve an existing roadbed and brook-crossing site, and which crosses the brook and immediately enters the southeast corner of unit 17.

  These three alternate routes were closely examined during project development by project planners and a road engineer. Evaluation included a team field visit including a botanist, biologist, foresters, landscape architect, soil scientist, and District Ranger. In each case, the team of specialists agreed that potential adverse resource effects of constructing new roads in these three locations far outweighed the perceived benefit of avoiding a crossing at the formerly used Slippery Brook crossing site as proposed in Alternatives 2 and 4.

- ***Allow logging to occur only during summer and fall to allow NFSR 17 (Slippery Brook Road) to remain unrestricted for snowmobile use.*** An alternative that would not winter harvest was considered, and generated considerable discussion about methods to reduce or mitigate affects to snowmobiling on Slippery Brook trail, East Branch trail, and Switchback trail. This alternative was deleted form further study because although only five units required winter logging, winter logging would be allowed in all of them. There are many perceived resource benefits supporting winter logging, for experience and monitoring on the White Mountain National Forest and other locations has shown that duff and soil disturbance is least when operated on frozen ground or snow. On occasion, and indeed for some units in this project, soil scarification is a legitimate resource management objective for it may stimulate improved germination and regeneration of certain hardwood species. However, this is not an objective for about half of the units in this project.

Example of typical winter logging operations in a thinning prescription on the WMNF, 2003

D. Comparison of Alternatives

The following table compares the alternatives by measurement indicators (acres, percents, and effects). The environmental effects of each alternative are discussed in detail in Chapter 3, Environmental Consequences.

Table 5. Summary of Effects

Measurement Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Issue 1: Roadless Character				
Percent regeneration cuts in the WRRA plus project *	239 acres 0.33 %	294 acres 0.40 %	239 acres 0.33 %	251 acres 0.35 %
Miles of classified roads plus new road in the WRRA	10.05 Miles	10.05 Miles	10.05 Miles	10.05 Miles
Cumulative acres & percent of WRRA in non-native planted trees and wildlife openings	0 acres 0 percent	0 acres 0 percent	0 acres 0 percent	0 acres 0 percent
Cumulative acres of Core Area of Solitude effected by this proposal	None	93 acres	None	79 acres
New permanent improvements within the WRRA	None	None	None	None
Issue 2: Clearcutting				
Early successional ** habitat created within the HMU	58 acres 0.7 percent	258 acres 3.1 percent	110 acres 1.3 percent	179 acres 2.2 percent
Estimated acres of new openings viewed from key viewpoints***	0	Doublehead 22 Baldface 27 Eastman 42 Kearsarge 33 Mountain Pond 5	Doublehead 0 Baldface 16 Eastman 20 Kearsarge 3 Mountain Pond 3	Doublehead 6 Baldface 19 Eastman 37 Kearsarge 25 Mountain Pond 5
Distance of trail along which clearcutting would occur	0	1500 feet hiking & 2000 feet snowmobile	2000 feet snowmobile	2000 feet snowmobile

* Acres (and percent) of early successional habitat (clearcuts, seed tree and shelterwood) created within the WRRA cumulatively within the last 10 years plus this action. Forest Service Handbook (FSH) 1909.12, Chapter 7, item 7.11b(7) establishes a criteria for roadless areas in the east at 20% or less of the area harvested within the last ten years. There are 77 acres clearcut within WRRA within the last ten years. The Peabody Vegetation Management Project (Androscoggan Ranger District) would potentially create 62 more acres. Cumulatively, 77 existing and 162 potential equal 239 as a base level. This Project would potentially create another 55, 0, or 12 acres as proposed under each alternative.

** There are 18 early successional habitat acres (clearcuts) within HMU 505, and another 40 acres cut in the late 1980's which although adequately stocked, are considered early successional habitat due to moose browsing, which has kept the average stand height under ten feet.

*** Acres of openings viewed from Eastman, Doublehead, Kearsarge, and Baldface Peaks, and from Mountain Pond. Acres shown represents the maximum openings viewed from any one viewpoint.

Chapter 3 – Affected Environment and Environmental Consequences

Introduction

This analysis considers the effects of the project proposal on the following resources: Recreation; Visual Quality Objectives; Roadless/Wilderness Characteristics, Soils (Erosion and Calcium); Water (Quantity & Quality); Fisheries; Wildlife (including vegetation - Habitat), Wildlife (Management Indicator Species, Other Species of Concern, Federal Threatened, Endangered, and Proposed Species (TEPS), and Regional Forester Sensitive Species (RFSS)); Heritage Resources; Invasive Plants; and Socio-economics.

Specific issues regarding resources that were raised during the scoping process are addressed in this chapter. Each resource section is organized as follows:

- Issue related to the Resource
- Description of Affected Environment (Existing Condition)
- Analysis of Direct and Indirect Effects on the Resource (By Alternative)
  - Direct Effects are caused by the action and occur at the same place and time
  - Indirect Effects are foreseeable effects that occur later in time or farther removed in distance
- Analysis of Cumulative Effects on the Resource (By Alternative)
  - Cumulative Effects result from the incremental impact of the action when added to other past, present and reasonably foreseeable actions, regardless of which government agency or individual undertakes such other actions.

3.1 Roadless/Wilderness Character

Issue Related to Roadless/Wilderness Character

- ***Effect that proposed harvesting and access for units on the west side of Slippery Brook and near Eastman Mountain might have on the suitability of this area for inclusion in a proposed Roadless Area***

Affected Environment

As part of the Forest Planning process, the White Mountain National Forest is required by law to conduct an inventory of lands within the National Forest that qualify as "roadless." Then, the Forest must evaluate and consider these lands for recommendation as potential Wilderness areas.

1986 Forest Plan Roadless Areas

For the 1986 Forest Plan, 17 Roadless Areas totaling about 353,000 acres were inventoried on the White Mountain National Forest. From that inventory, the Forest Service recommended and Congress approved the 12,000-acre Caribou-Speckled Wilderness. The White Mountain National Forest currently has 5 congressionally-designated Wilderness areas, totaling 114,000 acres. Two of the remaining 16 Roadless Areas, Wild River and Kearsarge, are adjacent to the Chandler-Round Project Area.

In January 2001, President Clinton approved the Roadless Area Conservation Rule which would have provided greater protection for these Roadless Areas than the 1986 Forest Plan. For Wild River Roadless Area, the Conservation Rule applies to the RARE II area shown on Figure 3. To date, the Conservation Rule has not been formally implemented. However, the Forest Service is following temporary direction to protect these areas by requiring that the Chief of the Forest Service approve any new road construction or timber harvest within the boundaries of the Roadless Areas covered by the new rules. Chandler-Round Project does not propose any road construction or timber harvest within any Roadless Area covered by the Roadless Area Conservation Rule.

Forest Plan Revision – 2004 Roadless Area Inventory

For the ongoing Forest Plan Revision, the White Mountain National Forest has recently completed the 2004 Roadless Area Inventory for Forest Plan Revision. This inventory considers all National Forest lands for their Roadless Area potential, accounting for new land acquisition, changes to the landscape since the last Forest Plan, and improved computer technology for evaluating areas. The 2004 Roadless Area Inventory includes 17 Roadless Areas totaling nearly 508,000 acres (including 114,000 acres of Wilderness). It expands the Wild River and Kearsarge Roadless Areas (see Figure 3). Harvest Units 9, 11, 26, 28, and 29 of the Chandler-Round Project Area fall within the boundary of the Wild River Roadless Area. Kearsarge Roadless Area is not affected by this project. A map of the 2004 Roadless Area Inventory is available at the Saco Ranger District or at the link listed below.

Roadless Characteristics

Roadless characteristics are quantitative and objective, and they determine whether an area may be considered for recommendation as Wilderness. Since a portion of the Chandler-Round Project Area falls within the boundaries of the Wild River Roadless Area, the effects of the project proposal on the roadless characteristics of this area will be analyzed. Not all of the roadless characteristics will be evaluated, since only some of these characteristics are affected by the Chandler-Round project proposal.

The following roadless characteristics will be analyzed:

- To be roadless, an area must have less than a 0.50 mile (½-mile) of improved roads per 1,000 acres of National Forest.
- To be roadless, the percentage of an area that has had a regeneration timber harvest (clear cuts, seed tree cuts and shelterwood cuts) within the past 10 years must be less than 20%.
- To be roadless, the percentage of an area that has non-native tree plantations or permanent wildlife openings must be less than 15%.
- To be roadless, an area should have a core of solitude of at least 2,500 contiguous NF acres that is not impacted by motorized influences (and meets primitive or semi-primitive non-motorized recreation opportunity guidelines).

The Forest Plan Revisions 2004 Roadless Area Inventory has determined that the Wild River Roadless Area includes 71,387 National Forest acres, with 10.05 miles of improved roads (a density of 0.14 mile per 1,000 NF acres). For more information, reference the 2004 Roadless Area Inventory, *at* (**www.fs.fed.us/r9/white**).

The Analysis Area for direct, indirect and cumulative effects on roadless characteristics is the 2004 Roadless Area Inventory - Wild River Roadless Area and considers its existing characteristics and how the proposed project, and any projects in the foreseeable future, may effect these characteristics. Since the Forest Plan Revision will make a determination on future management of the Wild River Roadless Area, the foreseeable future will include any potential activities between now and the implementation of

the revised Forest Plan, anticipated in 2005.

Wilderness Characteristics

Once an area has qualified as Roadless, it is evaluated in the Forest Plan Revision process to determine if it has characteristics consistent with Wilderness. Not all Wilderness characteristics are be evaluated because only some characteristics are affected by the Chandler-Round project proposal.

The following Wilderness characteristics are analyzed:

- Solitude, or the degree to which an area provides visitors with a Wilderness experience. Analysis will consider short-term effects and any reduction in the core area of solitude as a result of the project proposal.
- Degree of Disturbance, or the degree to which an area's natural appearance may be altered. Analysis will consider the effects of timber harvest and road restoration or construction.

Analysis of Wilderness characteristics may involve some of the same criteria as for roadless characteristics. However, a proposed project may not affect an area's designation as Roadless but may still affect an area's potential Wilderness characteristics of 'solitude' or 'degree of disturbance'.

The nearest congressionally-designated Wilderness Area to the Chandler-Round Project Area is the Caribou-Speckled Mountain Wilderness, which is over five miles from the nearest harvest unit.

The Analysis Area for direct, indirect and cumulative effects on Wilderness characteristics is the same as for roadless characteristics. The time frame for cumulative effects will be the same, as well.

3.1.1 Direct and Indirect Effects on Roadless/Wilderness Character

Summary of Direct & Indirect Effects on Roadless/Wilderness Character

Analysis Area	Estimated Acres
Wild River Roadless Area	71,387 NF acres

Alternative	Summary of Direct & Indirect Effects
1	Proposes no activities; No effect to roadless or Wilderness characteristics
2	55 acres of regeneration harvest and 0 acres of wildlife opening will not affect roadless designation. It would add breifly and locally (0.07%) to the degree of disturbance in the Roadless Area; No new roads are proposed.
3	0 acres of regeneration harvest, 0 acres of wildlife openings and no added improved roads are proposed.
4	12 acres of regeneration harvest, 0 acres of wildlife openings and no added improved roads are proposed; Effects similar to Alternative 2 but reduced in scale. It would add breifly and locally (0.02%) to the degree of disturbance in the Roadless Area. No new roads are proposed

Alternative 1: No Action Alternative

Alternative 1 proposes no timber harvest or road restoration or construction, and it would have no effect on the roadless or Wilderness characteristics of the Analysis Area.

Action Alternatives 2-4

The 1986 Forest Plan permits up to 1,496 acres of regeneration harvest and 449 acres of wildlife openings on MA 2.1 and 3.1 lands within the Analysis Area. To qualify as a Roadless Area, the criteria permit up to 14,278 acres of regeneration harvest and 10,708 acres of wildlife openings within the Analysis Area, well beyond the scope of what is permitted by the existing Forest Plan.

Alternative 2 proposes the largest acreage of clearcuts within the 2004 Roadless Area Inventory – Wild River Roadless Area, at 55 acres, with none for Alternative 3, and 12 acres for Alternative 4. This adds 0.07 percent of the Roadless Area into regeneration condition for alternative 2, none for alternative 3, and 0.017 percent for alternative 4. See the following cumulative effects discussion for each of the Action Alternatives cumulative percents as compared to the 20 percent that is permitted by the roadless criteria (see 3.1.2 and 3.2.2 below, and Table 6).

The Action Alternatives would have limited effect on the roadless characteristics of the Analysis Area, and no effect on its eligibility as a Roadless Area. The Action Alternatives will add to the degree of disturbance in the Analysis Area, but they will not result in an irreversible or irretrievable change in the condition of the land or its capability as potential Wilderness.

3.1.2 Cumulative Effects on Roadless/Wilderness Character

Summary of Cumulative Effects on Roadless/Wilderness Character

Analysis Area	Time Period	Estimated Acres
Wild River Roadless Area	Present 2004-2005	71,387 NF acres

Alternative	Summary of Cumulative Effects
1	Does not contribute to cumulative effects on roadless or Wilderness characteristics
2	Foreseeable actions in near future will contribute to effects of the proposed 55 acres of regeneration harvest, however, when considered cumulatively, neither this action or future proposed actions would affect roadless designation opportunity
3	With 0 acres of regeneration harvest, Alternative 3 contributes less to cumulative effects than Alternative 2 or 4
4	With the proposed 12 acres of regeneration harvest in this alternative, Alternative 4 would contributes less cumulative effects than Alternative 2. Neither this action or future proposed actions would affect roadless designation opportunity

Past, Present and Reasonably Foreseeable Future Timber Harvest

The Analysis Area includes 14,959 acres of Management Area 2.1 and 3.1 lands on both the Androscoggin and Saco Ranger District. The Peabody Vegetative Management Project (Androscoggin Ranger District) has 62 acres of proposed harvest units and 0.25 miles of new road construction within the Wild River Roadless Area. The Androscoggin District anticipates no reduction in the core area of solitude from Peabody Project, however, a future proposal in the Connor Brook watershed (near the Maine state line) falls within the Wild River Roadless Area.

For this project, Alternative 2 proposes the largest acreage of clearcuts within the 2004 Roadless Area Inventory – Wild River Roadless Area, at 55 acres. Cumulatively, the 55 acres added to 77 existing acres, plus current and future acres on Androscoggin Ranger District (122 acres), plus a potential 40 acres forseeable in the East Fork of the East Branch of the Saco River, plus 4 acres of permanent wildlife openings, total to 298 acres, or 0.4 percent. Therefore, the acres proposed in each of the Action Alternatives fall well short of the 20 percent that is permitted by the roadless criteria (see Table 6).

The potential future project in the East Fork of the East Branch of the Saco River within a decade, would include the northwest third of HMU 505, outside of any area being treated under this project. It would likely also include HMU 507. Estimates are that less than 40 acres within the Wild River Roadless Area would be included as regeneration cuts. Any project proposal in the future, on Saco or Androscoggin Ranger Districts, would receive its own public scoping, effects analysis, and documentation. These projects would likely be planned sometime following completion of the Revised Forest Plan.

The roadless criteria would permit up to 35.7 miles of improved roads in the 71,387-acre Wild River Roadless Area. The inventory identifies 10.05 miles of existing improved roads. None of the alternatives propose additional miles of improved road. Cumulatively, with 0.25 acres proposed in Peabody Project, a total of 10.3 miles of new road is well below the threshold permitted by the roadless criteria (see Table 6).

The Action Alternatives, when considered cumulatively with these anticipated future actions, would still have no effect on the eligibility of the Analysis Area as a Roadless Area. Future actions may reduce the core area of solitude slightly, but the Action Alternatives will not add cumulatively to the degree of disturbance in the Wild River Roadless Area, and they will not result in an irreversible or irretrievable change in the condition of the land or its capability as potential Wilderness.

Table 6. Summary Table of Cumulative Effects on Wild River Roadless Area

Roadless Characteristics	Wild River Roadless Area			
Total Acres	**71,387**			
Regeneration Acres				
Acres Allowed to Remain Roadless (20%)	14,278			
Acres Allowed by Current Forest Plan [1]	1,496			
Inventoried Regeneration Acres	77			
Acres Added by Chandler-Round Proposal	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
	0	55	0	12
Acres Added (Peabody and other forseeable)	162			
Improved Roads				
Miles Allowed to Remain Roadless	35.7			
Inventoried Miles	10.05			
Miles Added by Chandler-Round Proposal	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
	0	0	0	0
Miles Added under Peabody Action	0.25			
Permanent Wildlife Openings				
Acres Allowed to Remain Roadless (15%)	10,708			
Acres Allowed by Current Forest Plan [2]	449			
Inventoried Permanent Wildlife Opening Acres	35			
Acres Added by Chandler-Round Proposal	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
	0	0	0	0
Acres Added by Foreseeable Future Actions	4			
Solitude and disturbance				
Acres Allowed to Remain Roadless	2,500			
Inventoried Core Acres of Solitude	54,982			
Core Acres after Chandler Round Proposal	54,982			
Core Acres after Foreseeable Future Actions	54,982			

[1] Equals maximum allowed under current Forest Plan (10% of MA 2.1 and 3.1).
[2] Equals maximum allowed under current Forest Plan (3% of MA 2.1 and 3.1).

3.2 Effect of Clearcutting on Scenery

Issue: *Evidence of openings created during harvest activities may be apparent to individuals viewing the project area from South Baldface, Doublehead, Eastman, and Kearsarge Mountains, or from Mountain Pond or the Slippery Brook Trail.*

Affected Environment - Scenery

The project is located on National Forest lands mapped primarily as Variety Class B (common). Variety Class identifies the scenic quality of the landscape based on characteristics of land, vegetation, water, and rock ledges. Variety class B has moderate terrain with rounded hills or ridges that are not visually dominant and river valleys with moderate relief. Geologic features present are common and would not be outstanding in form, color or shape. Vegetation cover with interspersed pattern offers some visual relief. Water features exhibit common characteristics. Other portions of the project area are mapped as Variety Class C (minimal). Refer to Forest Plan Chapter VII-I for detailed description of these levels.

The analysis area is mapped as Sensitivity Level 2 (Moderate, or Average) in most of the Variety Class B areas. This is because use levels are well below 50 vehicles per day. Variety Class C areas have a Sensitivity Level of Low. Use within the project area is very light, with most summer use occurring on at Mountain Pond and on the access trail to Mountain Pond..

Use levels on Slippery Brook Trail during the summer of 2003 were about one to two vehicles per week. Use on Mountain Pond trail averages about one to two vehicles per day. Most of this use is to access the shelter. Light use occurs on the trail around the lake. Field observations from viewpoints were completed in 2003.

Snowmobile use on the Switchback trail is moderate during winter months. This use occurs primarily on weekends and vacation weeks, and is transient in that riders do not stay in the area, but are passing through at normal operating speeds.

The Forest Plan (Chapter VII-I-1, and III-11) suggests that management activity in this analysis area should meet Visual Quality Objectives (VQO's) of Retention for foreground views, Partial Retention for middleground and background views. Middleground views are between 1/4 mile and 3-5 miles from the viewer. Background viewpoints are beyond that.

Based on the Forest Plan Visual Quality Guidelines, Table 7 displays the maximum number of acres that may be observed from a stationary viewpoint for any one opening, or a vehicle oriented observation.

Table 7. Allowable Observed Acres of Individual Openings

(Forest Plan Visual Quality Guidelines, observed from designated viewpoint)

VQO	Distance Zone	Stationary Observation (Acres)	Vehicle Observation (Acres)
Partial Retention	Middleground	10	15
Partial Retention	Background	15	25
Retention	Foreground	1	3

A VQO of Retention is applied to foreground views from Slippery Brook Trail. Retention means that management activities are not evident to the casual visitor (Forest Plan, Appendix C6, on pages VII-C-17 and VII-C-18).

The physical appearance of the land in and around the analysis area is primarily mature northern hardwoods with a strong softwood component on upper elevation ridges and high peaks. Softwoods are interspersed with hardwoods in the valley bottoms. Evidence of past management activities are present, including several former openings that now have young trees 8 to 20 feet tall, and three existing openings with younger regeneration (48 acres). These former openings, evident because of their smooth texture, are now approaching fifteen to thirty years of age. Except for 48 acres, these former openings are no longer considered early successional habitat.

Views of the analysis area from nearby peaks and along Slippery Brook (road corridors) are a mosaic of continuous forest with textural variety resulting from changes in stand type and stand age. These textural changes appear natural except where a defined edge has resulted where openings larger than two acres occur. Former openings more than thirty years old are less apparent. Textural changes resulting from thinning and single tree selection harvests are not normally apparent because a consistent canopy remains after treatment.

Small openings may be noticeable for a period of years following group selection where average opening size exceeds an acre. All openings become dense with regenerated foliage in about ten years. In another twentyfive years, stand heights approach those of adjacent stands.

Seen area differs from different vantage points. Views from trails, roads and even some views from peaks (Eastman) are blocked by dense vegetation. Visibility of harvest units from peaks is primarily a concern when involving views of clearcuts or group selection openings. Views of some openings are reduced in size from the actual acres due to the edge effect of adjacent vegetation, due to topography and aspect, and because of reserve patches placed in key areas. Group selection openings are often not noticeable at all because of the tree cover at the leading edge of the opening.

In some instances, uneven-aged management may enhance visual quality by extending the view into the stand. When analyzed at a broader level, vegetative changes resulting from even-aged and uneven-aged management blend into the existing textural diversity and human-related development in the surrounding landscape.

3.2.1 Effect on Scenery under Alternative 2

Table 8 displays the estimated opening size viewed from each viewpoint for alternative 2. The corresponding Visual Quality Objective “seen acres allowed” for each viewpoint, and the distance to the opening is also displayed. The “seen acres” from each viewpoint listed in the table are generated from a computerized visual analysis model and interpreted with on-site visits and photos.

Thin and single tree selection units along Slippery Brook trail would appear more spacious than prior to the treatment. For most viewers, tree size, shape and apparent stand health would appear similar to that presently. Thinning and single tree selection treatments in these areas would result in removal of a quarter to a third of the basal area. The stands would continue to appear natural, and would regain foliar density within a few years as tree limbs and forest floor vegetation grows into open spaces for sunlight. Existing landings and roads along Slippery Brook trail would be cleaned and seeded or allowed to

revegetate naturally following completion of the sale. Limiting the number and location of skid trails would minimize visible disturbance to ground surfaces adjacent to Slippery Brook trail.

Table 8. Units and openings seen from known Viewpoints under Alternative 2

Viewpoints	View Distance	Est. Visible Opening	Seen acres allowed	S & G's
North Doublehead Mountain	3.7 miles 2.9 miles 2.6 miles	Unit 9: 15 acres Unit 22: 3 acres Unit 30: 4 acres	15 # 10 15	Meets
Mount Kearsarge #	4.8 miles 6.6 miles 5.9 miles 5.9 miles 6.2 miles	Unit 2: 3 acres Unit 9: 6 acres Unit 22: 10 acres Unit 25: 5 acres Unit 30: 9 acres	15 15 15 15 15	Meets
South Baldface Mountain	3.5 miles 2.4 miles 2.0 miles 2.5 miles	Unit 2: 3 acres Unit 7: 13 acres Unit 9: 8 acres Unit 22: 3 acres	10 15 10 10	Meets
Eastman Mountain	2.6 miles 1.4 miles 0.9 miles 1.5 miles 1.3 miles 2.0 miles	Unit 2: 5 acres Unit 7: 15 acres Unit 9: 5 acres Unit 22: 6 acres Unit 25: 6 acres Unit 30: 5 acres	10 15 10 10 10 15	Meets
Mountain Pond	0.4 miles 1.8 miles	Unit 2: 3 acres Unit 30: 2 acres	3 15	Meets
Slippery Brook Trail*	Foreground	U 6, 8, 10 - no opening unit 9**	Retention **	Meets

* Slippery brook trail begins at the gate ¼ mile past Mountain Pond. Retention applies to this section of trail.

Background views in Partial Retention allow for 15 acres of viewed opening. Units classified as Modification in Forest Plan VQO mapping (7, 26, 28, 30 and the north half of 2), allow for 15 acres viewed.

** Units seen in foreground views from these trails are thin or single tree selection except for unit 9, a clearcut under alternative 2 only. Unit 9 would receive a 100 foot no-cut buffer along the trail.

S & G's: Forest Plan Standards and Guidelines

3.2.2 Effect on Visuals under Alternative 3

In this alternative, all units west of Slippery Brook are omitted. Clearcut units 2 and 7 are the only openings larger than 2 acres. Group selection units will have several ¼ acre to two acre openings.

Table 9 displays the opening size viewed from each viewpoint for alternative 3. The corresponding Visual Quality Objective "seen acres allowed" for each viewpoint, and the distance to the opening is also displayed. The "seen acres" are interpreted from a visual analysis model plus on-site visits.

Thin and single tree selection units 6 and 10 along Slippery Brook trail would appear more spacious than prior to treatment. For most viewers, tree size, shape, and stand health would appear similar to that presently. Stands would appear natural as they regain foliar density and as tree limbs and ground vegetation regrows. Existing roads and landings would be seeded or allowed to revegetate naturally.

Table 9. Units and openings seen from known Viewpoints under Alternative 3

Viewpoints	View Distance	Est. Visible Opening	Seen acres allowed	S & G's
Mount Kearsarge	4.8 miles	Unit 2: 3 acres	15 #	Meets
South Baldface Mountain	3.5 miles 2.4 miles	Unit 2: 3 acres Unit 7: 13 acres	10 15	Meets
Eastman Mountain	2.6 miles 1.4 miles	Unit 2: 5 acres Unit 7: 15 acres	10 15	Meets
Mountain Pond	0.4 miles	Unit 2: 3 acres	3	Meets
Slippery Brook Trail*	Foreground	U 6, 10 - no opening	Retention**	Meets

* Slippery brook trail begins at the gate ¼ mile past Mountain Pond. Retention applies to this section of trail. All other viewpoints are classified as Partial Retention.

Background views in Partial Retention allow for 15 acres of viewed opening. Units classified as Modification in Forest Plan VQO mapping (7, 30 and the north half of 2), allow for 15 acres viewed.

** Units seen in foreground views from Slippery Brook trail are thin or single tree selection prescriptions . Units 8 and 9 are omitted from this alternative. No clearcuts are visible from Slippery Brook Trail, or from North Doublehead Mountain under this alternative.

S & G's: Forest Plan Standards and Guidelines

3.2.3 Effect on Visuals under Alternative 4

In this alternative, clearcut units 25, 28 and 30 are reduced is size. Unit 9 is changed from clearcut to thin. Units 21 and 18 are omitted, although they are not seen in any alternative, being partial cuts.

Table 10 displays the opening size viewed from each viewpoint for alternative 4. The corresponding Visual Quality Objective "seen acres allowed" for each viewpoint, and the distance to the opening is also displayed. The "seen acres" are interpreted from a visual analysis model plus on-site visits.

Single tree selection unit 6, and thin units 9 and 10 along Slippery Brook trail would appear more spacious. For most viewers, tree size, shape and apparent stand health would appear similar to that presently. Stands would appear natural as they regain foliar density and as tree limbs and ground vegetation regrows. Existing roads and landings would be seeded or allowed to revegetate naturally.

Table 10. Units and openings seen from known Viewpoints under Alternative 4

Viewpoints	View Distance	Est. Visible Opening	Seen acres allowed	S & G's
North Doublehead Mountain	2.9 miles 2.6 miles	Unit 22: 3 acres Unit 30: 3 acres	10 15	Meets
Mount Kearsarge	4.8 miles 5.9 miles 5.9 miles 6.2 miles	Unit 2: 3 acres Unit 22: 10 acres Unit 25: 5 acres Unit 30: 7 acres	15 15 15 15	Meets
South Baldface Mountain	3.5 miles 2.4 miles 2.5 miles	Unit 2: 3 acres Unit 7: 13 acres Unit 22: 3 acres	10 15 10	Meets
Eastman Mountain	2.6 miles 1.4 miles 1.5 miles 1.3 miles 2.0 miles	Unit 2: 5 acres Unit 7: 15 acres Unit 22: 6 acres Unit 25: 6 acres Unit 30: 5 acres	10 15 10 10 15	Meets
Mountain Pond	0.4 miles 1.8 miles	Unit 2: 3 acres Unit 30: 2 acres	3 15	Meets
Slippery Brook Trail*	Foreground	U 6, 10 - no opening unit 9**	Retention **	Meets

* Slippery brook trail begins at the gate ¼ mile past Mountain Pond. Retention applies to this section of trail. Background views in Partial Retention allow for 15 acres of viewed opening. Units classified as Modification in Forest Plan VQO mapping (units 7, 30 and the north half of 2), allow for 15 acres viewed.

** Units seen in foreground views from Slippery Brook trail are thin or single tree selection prescriptions . Unit 8 is omitted from this alternative. No clearcuts are adjacent to Slippery Brook Trail. Unit 9 is a 21 acre thin (without a buffer) in this alternative.

S & G's: Forest Plan Standards and Guidelines

3.2.4 Cumulative Effect on Visuals

Cumulative effect considers effects of past, present and foreseeable activities across a larger area including adjacent private lands. There are no adjacent private lands affected by this action. Cumulative visual effects analysis for this project considers the peaks and trails indicted in the charts as the analysis area.

There would be increased cumulative visual effects as a result of this action, commensurate with the effects described above for each alternative. Other textural changes from previous management activities are currently evident from these viewpoints. These include 48 acres of existing opening seen from South Baldface and Eastman mountains. These 48 acres, in three openings are revegated, but remain in early successional status due to heavy moose browse. Other former openings throughout the viewshed are recovering from past management activities, and are primarily noticeable as textural changes. These textureal changes when seen at a distance become much less noticeable with new vegetation from new regeneration occupying the opening. Older openings blend well with the mosaic of textural variety offered across the landscape. Many of the existing twenty year old openings will be moving rapidly into pole size condition. Cumulatively, the visual affect as texture changes occur, and as new openings are created, is that of a dynamic landscape where vegetation changes blend with the landscape, and where reserve areas and other unit design mitigations minimize adverse visual affects.

3.3 Water

3.3.1 Watershed

Affected Environment

Chandler Round Timber Sale is located in the Slippery Brook and McDonough Brook watersheds (see Figure 9). Both watersheds are located in the headwaters of the Saco River and were delineated by the hydrologist according to topographic contour lines. Their total acreage is approximately 10,600, and they comprise the analysis area for cumulative effects on water resources.

The watershed of Slippery Brook contains approximately 6,240 acres. It is aligned north to south with the outlet to the south. Five unnamed intermittent channels and one unnamed perennial channel enter Slippery Brook from the west. A perennial channel that drains Mountain Pond, and an additional unnamed intermittent channel both enter Slippery Brook from the east. The southern border of the watershed is located where Slippery Brook flows into East Branch of the Saco River.

McDonough Brook watershed contains approximately 4,360 acres. It encompasses both McDonough Brook and Watson Brook which flow east and drain into Little Cold River. The eastern border of the watershed is located where McDonough Brook and Watson Brook join and form the Little Cold River. To the west, the watershed is bordered by Round Mountain.

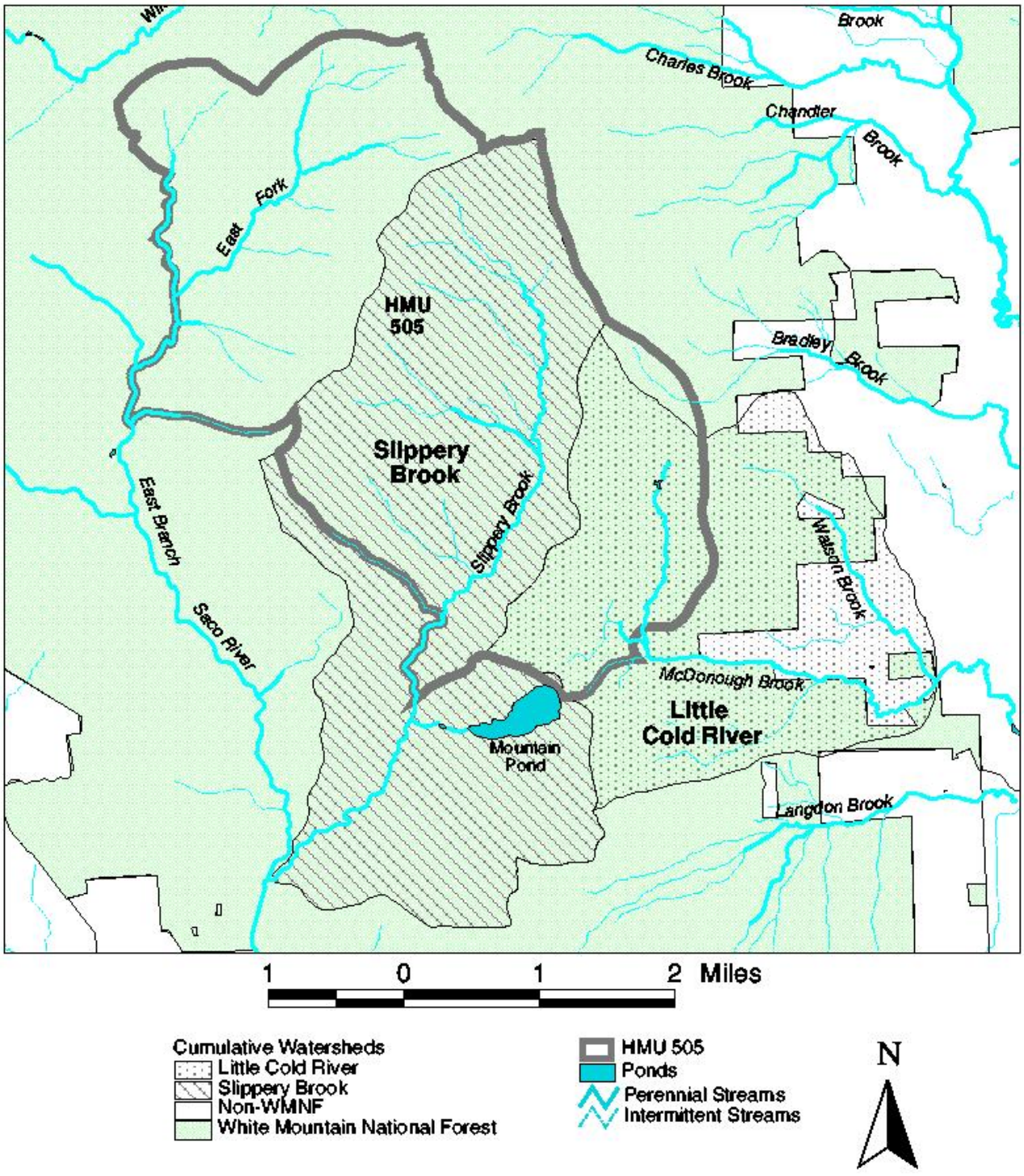

Figure 9:
Chandler Round Project Area
Cumulative Watersheds and Streams

Historic logging has occurred within the Slippery Brook and McDonough Brook watersheds. This was conducted primarily by horse logging and later by mechanized logging. Railroad logging occurred in the East Branch of the Saco River, but none is evident in Slippery Brook. During that period, trees were logged from riparian areas and woody material was removed from streams. Subsequent flooding and scour added to these effects and resulted in portions of the watersheds with less than potential levels of woody material and loss of diverse channel and floodplain characteristics. There is no knowledge of fires occurring in these watersheds. Today, increased woody material contributes to the protection of stream banks, and creation of habitat for aquatic species.

Streams are important because they are pathways that transport water, sediment, and nutrients through the landscape. Streams that have water in them continually are called perennial streams. Ephemeral is the name for streams that only flow right after it rains or during snowmelt. Streams that flow beyond a precipitation event but still not year round are called intermittent.

There are 7.1 miles of perennial stream and 8.6 miles of intermittent stream within the Slippery Brook watershed. Eighty-three percent of the perennial portions are located in the main branch of Slippery Brook. The rest of the perennial portions are located in two tributaries.

The McDonough Brook watershed is comprised of 6.2 miles of perennial streams and 5.8 miles of intermittent streams. Sixty-seven percent of the perennial portions are located in the main branch of McDonough Brook. An additional 28% of perennial channel is located in the main branch of Watson Brook. The remaining perennial portion is a tributary to McDonough Brook. The rest of the tributaries within the watershed are intermittent or ephemeral.

Most of the perennial stream portions within the project area have been classified using the White Mountain National Forest riparian classification system. A riparian area is a term used by the Forest Service that includes stream channels, lakes, adjacent riparian ecosystems, flood plains, and wetlands.

Riparian areas and stream courses on the White Mountain National Forest, including the Slippery Brook and McDonough Brook watersheds, are generally considered to be properly functioning. This means that the streams and their associated riparian areas exhibit the attributes and processes that are appropriate to each riparian area's capability and potential. Benefits applicable to riparian areas include dissipating stream energies associated with high flows, filtering sediment, development of diverse channel characteristics to provide habitat for aquatic biota, and protection of stream banks from scour.

3.3.2 Water Quantity

Affected Environment

Water quantity in streams is largely related to the amount of precipitation that occurs throughout the year. Evapo-transpiration has the greatest effect on stream flow from June through September, the growing season. Changes to vegetation result in changes to stream flow during the summer low flow periods (particularly August and September). The magnitude depends on the extent of change to the vegetation (Hornbeck, et al 1993).

When trees are removed, water yield is increased. Hornbeck, Martin, and Eagar (1997) summarize that at least 20-30% of the basal area in a watershed must be cut to generate detectable increases in annual

water yield. Water yield increases usually diminish within 3-10 years. Peak flows are often increased during the growing season immediately after cutting.

Effects of cutting on flows tend to be localized and are unlikely to extend beyond first or second order streams in well-managed forests, where relatively small portions of the watershed are being harvested at a given time. This is because such increases lose their identity as they join storm flow from the larger surrounding rivers (Neary and Hornbeck 1994). Where localized effects can occur, channel morphologies may adjust to a higher low flow level for the duration of the increase by altering their width and depth as well as bed load (Schumm, 1977). The magnitude of the increase in discharge and type of channel would dictate the extent of the change in channel characteristics.

Two units of the Langdon Brook Sale (1998) are located in the McDonough Brook watershed. These units are located near the unnamed intermittent tributary which enters McDonough Brook from the southwest. Four percent of the basal area of this subwatershed was removed during the sale. Based on the research described above, it is unlikely that localized water yield increases are currently present within the McDonough Brook watershed as the result of previous timber sale activity.

No timber sales have occurred in the past ten years in the Slippery Brook watershed. It is therefore unlikely that localized water yield increases are currently present within the watershed. Skid trails and landings are vegetated and stable, showing little evidence of sheet or rill erosion. Water quality remains high in the watersheds.

The tributaries to Slippery Brook and the upper 2.4 miles and lower 2.4 miles of the main stem of Slippery Brook exhibit these stable characteristics. In the McDonough Brook watershed, the tributary to Watson Brook and the upper 2.3 miles of Watson Brook exhibit these characteristics, as do the middle 2.9 miles of McDonough Brook and its tributaries.

The middle section of Slippery Brook, lower Watson Brook, and lower and upper McDonough Brook have a wider active floodplain due to more active meandering processes. Site visits to Slippery Brook have verified that the middle section of the main stem is actively adjusting, with extensive movement of bed material. The source of this instability is unknown. Although this reach has a larger component of gravel and sand than in the steeper sections, it is a cobble dominated reach.

3.3.2.1 Direct and Indirect Effects on Water Quantity

Summary of Direct and Indirect Effects on Water Quantity

Analysis Area	Time Period	Estimated Acres
Project Watersheds	1993 to Present	Approximately 25,710 acres of private and public lands

Alternative	Summary of Direct & Indirect Effects
1	No new direct or indirect effects; roads maintained at current levels; On-going activities would continue
2	Localized short-term effects due to road restoration and timber harvest activities, amount of basal area removed in one subwatershed may exceed the level at which increases in water yield become measurable, but observed revegetation of previous harvest units diminishes this effect
3	Effects same as Alternative 2
4	Effects same as Alternative 2

Existing former truck road within harvest unit 17 shows existing regeneration stabilizing road. This road was last used in the early 1990's and would be used as a skid road, which is normally narrower and recovers more quickly than a truck road. Note the pole sized saplings in the background.

3.3.2.2 Direct and Indirect Effects on Water Quality and Channel Stability

Table 11. Summary of Direct and Indirect Effects on Water Quantity and Channel Stability

Analysis Area	Estimated Acres
Subwatersheds of Slippery Brook and McDonough Brook	Approximately 10,600 acres of private and public lands

Alternative	Summary of Direct and Indirect Effects
1	No new direct or indirect effects. On-going activities would continue.
2	The percent basal area removed in each subwatershd does not exceed 25%. Effects of timber harvesting would be localized and short-term.
3	Effects same as Alternative 2. Fewer subwatersheds are affected.
4	Effects same as Alternative 2.

Alternative 1: No Action Alternative

There would be no new direct or indirect effects of water quantity on channel stability from implementation of Alternative 1 (No Action). Streams and riparian areas would continue to function much in the same way as present. Forest Plan direction, Standards and Guidelines, and Best Management Practices would continue throughout the project area. Current and on-going management activities would continue, but no new federal management activities would be initiated. Changes, such as road maintenance, might occur through current management direction, natural processes, or other management decisions in the future.

Action Alternatives 2-4

The discussion on water quantity and channel stability will reference smaller subwatersheds within the Slippery Brook and McDonough Brook watersheds. These smaller streams may adjust channel dimensions if water quantity increases are great enough. Watershed and stream characteristics determine this response. These effects may go unnoticed if too large of a watershed is analyzed (Hornbeck, personal communication). In addition, a water yield analysis requires that the entire watersheds of channels in treatment areas be considered, not just the units being proposed for treatment.

Five unnamed intermittent channels and one unnamed perennial channel enter Slippery Brook from the west. One intermittent channel and one perennial channel enter Slippery Brook from the east. The watersheds of these tributaries were delineated for the water quantity analysis. They were numbered 1-8, beginning with the southwest tributary and moving clockwise. The subwatershed of side slopes between tributaries 2 and 3 and tributaries 7 and 8 were also delineated.

Three subwatersheds in McDonough Brook were analyzed. The first was the headwaters of

McDonough Brook, upstream of any tributaries entering the channel. The second was the watershed of the perennial tributary to McDonough Brook. No harvesting was proposed outside of these two subwatersheds. The intermittent which enters McDonough Brook from the southwest was also analyzed, as previous timber harvesting has occurred in this location.

The measure for changes in water quantity is the percentage (%) of the basal area removed in each delineated subwatershed of Slippery Brook and McDonough Brook. These percentages are based on each unit's current basal areas and their predicted post-harvest basal areas. Timber sales which occurred within the last 10 years are analyzed along with the proposed alternatives. Where less than a 25% reduction in basal area is determined, no measurable increase in discharge is expected in the channel associated with those watersheds.

The basal area reductions in the Slippery Brook and McDonough Brook watersheds do not exceed the 25% threshold for any of the Action Alternatives (Table 12). No measurable increase in discharge is expected in the channels associated with those watersheds. Therefore, no channel adjustment is expected at this scale.

Table 12. Basal Area Removed in Smaller Subwatersheds of Interest, by Alternative

Watershed	Subwatershed	Stream Type	Percent of Basal Area Removed by Alternative				Percent of Basal Area Removed in Past 10 Years
			1	2	3	4	
Slippery Brook	Tributary 1	Intermittent	0	5	0	5	0
	Tributary 2	Intermittent	0	17	0	16	0
	Sideslope	Undefined	0	7	0	6	0
	Tributary 3	Perennial	0	1	0	0	0
	Tributary 4	Intermittent	0	0	0	0	0
	Tributary 5	Intermittent	0	0	0	0	0
	Tributary 6	Intermittent	0	0	0	0	0
	Tributary 7	Intermittent	0	0	0	0	0
	Sideslope	Undefined	0	7	1	6	0
	Tributary 8	Perennial	0	1	1	1	0
McDonough Brook	Headwaters	Perennial	0	13	13	10	0
	Tributary	Perennial	0	22	22	22	0
	Tributary	Intermittent	0	0	0	0	4

3.3.3 Water Quality

Affected Environment

The State of New Hampshire designates surface waters in the McDonough Brook watershed as Class B. This classification indicates that these waters are considered acceptable for fishing, swimming, and other recreational purposes and, after adequate treatment, for use as water supplies. The Slippery Brook watershed is classified as having Class A waters. There is no discharge of any sewage or wastes into waters of this classification. In addition, Class A waters are considered potentially acceptable for water supply uses after adequate treatment. Surface waters in the Slippery Brook and McDonough Brook watersheds are not currently used for municipal purposes. Recreationists who camp in the area use the streams as a water source following treatment. At present, there are no surface waters listed as not meeting water quality standards in the Slippery Brook or McDonough Brook watersheds by the state of New Hampshire.

Water quality monitoring in the Slippery Brook watershed was conducted from 1969-1979. This monitoring indicated nitrate levels which were well within water quality standards. In addition, current water quality monitoring is conducted seasonally at 20 monitoring sites scattered throughout the White Mountain National Forest. These sites were established to ensure that BMPs, Forest Standards and Guidelines, and additional mitigations were effective at preventing water quality from being impaired. Results of this monitoring indicate that streams within the forest are properly functioning and that nutrient concentrations fall within the water quality standards of the state of New Hampshire.

New Hampshire antidegradation provisions apply to all new and increased point and non-point source discharges of substances, including all hydrologic modifications and all other activities that would lower water quality or affect the existing surface waters of the State. Under these antidegradation provisions, waters of the National Forest are designated as "Outstanding Resource Waters" (ORW) and shall be maintained and protected (NHDES, 1999). This designation has higher water quality standards than Class A waters. Some limited point and nonpoint source discharges may be allowed, providing that they are of limited activity that results in no more than temporary and short-term changes in water quality. "Temporary and short term" means that degradation is limited to the shortest possible time. Such activities shall not permanently degrade water quality or result at any time in water quality lower than that necessary to protect the existing and designated uses in the ORWs. Such temporary and short-term degradation shall only be allowed after *all practical means* of minimizing such degradation are implemented. Best Management Practices (BMPs) as described in this report and other mitigations elsewhere in the EA represent 'all practical means' and would be used for any of the Action Alternatives.

Studies have shown that sediment from logging roads is evident during runoff events, even where BMPs are used (Patric, 1980; Likens, et al, 1970; Hornbeck et al, 1987). This indicates the importance of augmenting BMPs with Forest Plan Standards and Guidelines and site-specific mitigation measures to further reduce effects of sedimentation from roads and skid trails associated with timber harvest.

The EIS for the Forest Plan states, and experience with National Forest timber sale mitigations has shown, that sedimentation from roads, skid trails, and landings can be reduced to a negligible amount with the use of mitigations such as careful layout and construction, caution in wet and muddy conditions, and road closures. Minimizing the area of disturbed forest floor is a big step in controlling erosion and sediment movement into streams. This is accomplished by careful consideration of skid trail location, minimizing the number of skid trails, and avoiding steep slopes and wet areas. Other mitigations include the use of waterbars, avoiding operations during saturated and muddy periods,

avoiding disturbance to stream channels, and limiting harvest to dry or frozen ground conditions.

3.3.3.1 Direct and Indirect Effects on Water Quality

Summary of Direct & Indirect Effects on Water Quality

Analysis Area	Time Period	Estimated Acres
Slippery Brook and McDonough Brook Watersheds	1993 to Present	Approximately 10,600 acres of private and public lands

Alternative	Summary of Direct & Indirect Effects
1	No disturbance resulting from timber harvest or road restoration. Current condition remains
2	Estimated 99 acres of ground disturbance from skid trails, landings and road work, within which increased sediment transport could occur. Construction of four temporary bridges required. Removal of one bridge proposed
3	Estimated 45 acres of ground disturbance from skid trails, landings and road work, within which increased sediment transport could occur. No temporary bridges required. Removal of one bridge.
4	Estimated 95 acres of ground disturbance from skid trails, landings and road work, within which increased sediment transport could occur. Construction

Alternative 1: No Action Alternative

There would be no direct or indirect effects on water quality from implementation of Alternative 1 (No Action). The current condition would remain.

Action Alternatives 2-4

Based on field observations by timber sale administrators on the White Mountain National Forest, the maximum ground disturbance by skid trails for units harvested in summer or fall is approximately 10% of the unit. For units harvested in winter only, it is 1% of the unit.

The magnitude of effects caused by sedimentation is related to amount of disturbance, which is an indicator of the area across which increased sediment transport could occur. This area can be measured by acres of ground disturbance resulting from skid trails and landings, miles of new road construction, and miles of pre-haul maintenance on existing roads. Table 5 summarizes these measures for comparison by alternative. Season of harvest does not vary by alternative. This analysis assumes

summer and fall harvesting where those allowed in the Alternative tables. Of the Action Alternatives, Alternative 3 disturbs the fewest acres (44.9 acres), and Alternative 2 disturbs the most (99.4 acres).

Table 13. Summary of Water Quality Measures: Acres of Ground Disturbance from Timber Harvest and Road Construction/Pre-Haul Maintenance

Alt	Landings	Skid Trails	Road Construction		Pre-Haul Maintenance		*Total Disturbance*
	acres	acres	miles	acres	miles	acres	acres
1	0	0	0	0	0	0	0
2	11	74	0.3	0.5	8.2	13.9	99.4
3	8	32	0	0	2.9	4.9	44.9
4	11	70	0.3	0.5	8.2	13.9	95.4
NOTE: 1 mile of road at an average width of 14' = 1.7 acres of disturbance/mile							

The temporary stream crossing proposed in Alternatives 2 and 4 at Slippery Brook includes a temporary, removable and re-useable bridge. This temporary bridge will be left in place for the life of a sale west of Slippery Brook (2-3 years). It will provide access to NFSR 17A west of Slippery Brook. The left bank of Slippery Brook is much lower than the right bank. A 60-80 foot ramp will be constructed on the left bank to bring the bank elevation up to the height of the right bank. However, the construction would occur in the floodplain and would potentially result in altered storm flows. To help mitigate these impacts, the ramp will be made of large porous rocks and will contain culverts so that if water flows onto the floodplain it would not wash out the ramp. Although the ramp would be capable of passing water, it is likely that some ponding would occur upstream of it during times of high flow. If ponding occurs, it is likely that water would flow out over the road which leads up to the ramp, increasing sedimentation to the stream. Sediment control measures, such as sediment fences and proper road drainage structures, would therefore be needed along that portion of NFSR 17A that lies in the 100-year floodplain. This would prevent excess sediment from reaching the channel should a large storm event occur while the bridge and ramp are in place.

Alternatives 2 and 4 require the construction of three additional temporary bridges. Alternative 3 does not require any temporary bridges. All bridges will be wide enough so as not to constrict the stream channel during bankfull flows. Construction will be done in accordance with current standard specifications. In addition, bridges will be removed and banks restored following the completion of the timber sale.

Culverts would be installed along the new road construction for Alternatives 2 and 4. Although placement of the culverts in the stream channel will initially cause some disturbance, properly sized culverts that are capable of passing bankfull flows would minimize future stream crossing impacts. These culverts will be removed following sale closure. No new road construction is proposed under Alternative 3.

All Action Alternatives call for the removal of an existing bridge across Slippery Brook at the end of NFSR 17 near unit 9. The bridge is constricting Slippery Brook and collecting large woody material. This log jam is causing some stream instability in the form of channel widening and braiding. Removal of the bridge will cause some initial disturbance to the stream channel. However, once the bridge is removed the stream would stabilize itself and then function properly.

Effects on Nutrients in Water

Extensive timber harvest has the potential to cause chemical changes in water. Of the various chemical changes, studies have shown that it is the changes to nitrate concentrations that have the potential to exceed water quality standards for short periods of time after the removal of trees. However, high nitrate concentrations were associated with clearcutting entire watersheds (Pierce et al, 1970), while watersheds treated with more conventional methods, such as those proposed in Chandler Round, did not exceed water quality standards for nitrate (Hornbeck et al, 1973).

Water quality monitoring in the Slippery Brook watershed was conducted from 1969-1979. This monitoring indicated nitrate levels which were well within water quality standards. In addition, current water quality monitoring is conducted seasonally at 20 monitoring sites scattered throughout the White Mountain National Forest. These sites were established to ensure that BMPs, Forest Standards and Guidelines, and additional mitigations were effective at preventing water quality from being impaired. Results of this monitoring indicate that streams within the forest are properly functioning and that nutrient concentrations fall within the water quality standards of the state of New Hampshire.

In the Chandler Round Timber Sale, no more than 22% of any one subwatershed is being proposed for harvesting. Within HMU 505, about 12 percent of the HMU would be treated (including wildlife openings and proposed road activities) under Alternative 2, and less under alternatives 4 and 3 In addition, of the acres to be harvested, the majority are partial cuts, not clearcuts. Only 2.3 percent of the HMU would receive clearcuts. Since entire watersheds are not being clearcut, it is unlikely that the proposed treatments would cause increased nutrient concentrations in the streams.

In addition, stream nitrate concentrations have unexpectedly declined in White Mountain National Forest streams (Goodale et al. 2003). This indicates that soil nitrogen saturation may not be the concern originally visualized. It also may indicate that soil and stream acidification may be of less concern than originally thought.

Project Design and Mitigations designed to Maintain Water Quality

The effects of timber harvest on suspended sediment and turbidity have been studied extensively. Where roads are in place, one study has shown that mitigations keep suspended sediment levels less than 2 Nephelometric Turbidity Units (NTU) during non-storm flow on clearcut watersheds (Patric, 1980). The same study showed virtually no increase in average turbidity from lighter selection cuts that removed 25-30% of the basal area. Any increased turbidities have been found to be a result of skid trails and logging roads. Research has shown that the most effective factor for preventing sediment and nutrients from reaching a watercourse is a buffer strip (Gilliam, 1994).

Overall, the effectiveness of Forest Plan Standards and Guidelines, BMPs, and site specific mitigations can be demonstrated by looking at previous projects, both on and off-site, and by literature review. The types of harvesting activities included in the Proposed Action and its alternatives are similar to those that occur throughout the White Mountain National Forest. The Forest Service has extensive experience in mitigating the effects of these activities on soil erosion, sedimentation, and water quality. Recent

vegetation management projects across the National Forest have utilized old skid trails and landings that were used for previous projects. In most of these cases, the old skid trails and landings, even from as recent as 10 years past, are well vegetated and require brushing and clearing to be used again. Monitoring of post sale conditions in areas treated as recently as three to six years show that woody vegetation, grasses, or forbs often establishes quickly on these locations, providing for root holding capacity of the soils and litter layer (duff). The most recent examples of these findings may be found in EAs for the Tripoli, Peabody, County Line, Nubble and Iron Maple projects.

In addition, scientific research was sited in the Chandler Round EA which supports the field monitoring. On page 65 of the EA it states, "Most studies show that BMPs are effective at reducing or eliminating transport of sediments into watercourses (summarized by Stafford, et al., 1996)." Page 66 provides reference to a study by Gilliam in 1994 that identifies buffer strips as the "most effective factor for preventing sediment and nutrients from reaching a watercourse."

Forest Plan Standards and Guidelines require that at least 50% of the basal area be retained in the riparian area of perennial streams. These 'partial treatment' corridors are at least 50 feet wide, and increase with increasing slope.

In addition to BMPs and Forest Plan Standards and Guidelines, the Chandler Round Project is providing additional mitigations to further protect the water quality of streams. All mapped perennial and intermittent channels will receive at least a 15 foot no-cut buffer. In some areas, such as the west side of Slippery Brook, this buffer even wider and may exceed 100 feet. These no-cut buffers will further reduce the likelihood of adverse water quality effects. Equipment is not allowed in these buffer areas except at designated crossings, which are limited in number and location.

Designated crossings are limited to the fewest and best locations as needed. Designated crossings are generally on flat slopes, where stream velocity is at its lowest, and where crossing structures can be placed to keep equipment and logs above the water, and away from stream banks. Designated crossings are removed following treatment and streambanks restored to allow streams to flow unimpeded.

Forest Service Markers consider equipment capabilities, riparian concerns, and potential residual stand damage when determining how best to mark a unit. Existing skid trails and crossings are used where possible to limit the amount of ground disturbance. Skid trail locations are approved by the sale administrator prior to their use.

Skid trails are waterbarred according to Forest Plan standards. Waterbars are placed at frequencies proportional to steepness of slope, with steeper slopes requiring more water bars (see Forest Plan III-22). Waterbars re-direct cumulated runoff off skid trail surfaces and allow it to be dispersed over the immediate landscape below the waterbar. This allows the water to penetrate the soils, and any sediment to be retained on site. Buffer strips aid in 'catching' re-directed runoff from nearby skidtrails.

Waterbars are placed on skid trails in accordance with Forest Plan Standards and Guidelines, and BMPs. Waterbars are placed at frequencies proportional to steepness of slope; with steeper slopes requiring more water bars (see Forest Plan III-22). Waterbars slow accumulated runoff from the skid trail surface. The most effective factor for preventing sediment and nutrients from reaching a watercourse is a buffer strip (Gilliam, 1994). Trees adjacent to perennial streams will be retained, and trees will be felled directionally away from streambeds, where possible. Skid trails, including stream crossings will be laid out prior to harvesting, and Forest Plan Standards and Guidelines stipulate that skidding within 100 feet of a flowing stream will be limited to dry or frozen conditions, except on designated skid trails. In all of the Action Alternatives, winter harvest may occur for all harvest units if desired by the operator, or dry

soil or frozen conditions may be required by the Timber Sale Administrator for resource protection.

Winter harvest is effective at reducing disturbance at smaller stream crossings because activities occur when the channel is frozen or snow-covered. Mitigations such as temporary stream structures to protect the channel, drainage structures, and sediment control where needed, protect the overall integrity of the stream. This is particularly important in Slippery Brook, where portions of the channel are already actively adjusting and showing some instability. Designated crossings are the only sites which may require restoration after the proposed activities are done. Most studies show that BMPs are effective at reducing or eliminating transport of sediments into watercourses (summarized by Stafford, et al, 1996).

Approximately nine existing landings and two new landings are proposed in Alternative 2 and 4 of the Chandler Round Timber Sale. In Alternative 3, eight existing landings and one new landing would be needed. Landings average an acre in size. Existing landings are cleared of regeneration that typically exists on them. Following completion of the harvest activity, natural vegetation is allowed to re-claim the site. Waterbars and annual rye grass is used where needed to prevent runoff and erosion. The existing and proposed landings are located on flat terrain to reduce the likelihood of soil erosion or sediment transport. The included mitigations, in conjunction with buffer strips, would ensure that sediment does not reach streamcourses.

Most effects related to road reopening and skid trails are short term in duration and are mitigated through the use of mitigations listed in Appendix D. Elevated turbidity that normally occurs during storm events would remain. Contributions resulting from this action would decrease to near zero as skid trails re-vegetate and stabilize after use. Turbidity increases during storms related to use on permanent roads would probably continue as long as the roads are open. However, this effect would be mostly the same as what is occurring presently since all of the roads are in place except for 0.3 miles of new road construction proposed for Alternatives 2 and 4. No new road construction is proposed in Alternative 3.

Road maintenance would contribute to this effect since disturbance and use of the roadbed allows sediment to mobilize and be removed in subsequent rainfall events. Road maintenance occurs periodically under normal use patterns, even without timber haul and does not normally result in measurable levels of sedimentation. Since increases in turbidity normally occurs only during storm events when turbidities are naturally elevated, it is not likely that increases resulting from this project would effect aquatic life, stream morphologies, or overall water quality in the affected watersheds.

Existing skid trails, logging roads, and landings near the project area that were used as recently as ten years ago include Langdon Brook Timber Sale (1998), Kearsarge Timber Sale (2001), and Burnt Knoll Timber Sale (2003). Sites on these sales are well vegetated with hardwood or softwood advanced regeneration and show little evidence of erosion.

Skid trails and landings in the Chandler Round Project Area have not been used in about twenty years, and show ample evidence of regeneration with hardwood and softwood saplings. Unit 17, along Slippery Brook, is typical of this regeneration of old skid trails and landings, and includes an old logging road that is now covered with young spruce. If existing skid trails, roads, and landings are reused, they are expected to revegetate within five years, as has occurred in the past (see photographs and field notes in the project record). This monitoring information provides evidence that new skid trails, roads and landings are expected to revegetate within a similar period of time. The Forest Service will monitor the implementation of the Selected Alternative to ensure the continued effectiveness of all protective measures for water quality.

Research and field monitoring have demonstrated that harvest practices, performed in accordance with Forest Plan Standards and Guidelines, BMPs, and proven mitigations, will reduce water quality effects to "small and temporary", and therefore should not exceed water quality standards set for ORWs. Mitigation measures applied to the Chandler Round project are proven measures developed over many years of project implementation and monitoring on the White Mountain National Forest. Their effectiveness is supported by and consistent with results of research studies conducted on and off the National Forest. And, in addition, mitigations such as the no-cut buffers used in units adjacent to perennial brooks exceed Forest Plan and Best Management Practices requirements.

3.3.4 Cumulative Effects on Watershed, Water Quantity and Water Quality

Summary of Cumulative Effects on Watershed, Water Quantity and Quality

Analysis Area	Time Period	Estimated Acres
Slippery Brook and McDonough Brook watersheds	1994 to 2014	Approximately 10,600 acres of private and public lands

Alternative	Summary of Cumulative Effects
1	No disturbance resulting from timber harvest or road restoration on National Forest. No cumulative effect on disturbance resulting from activities on other lands.
2	Proposed activities are within Forest Plan Standard and Guidelines for amount of acres clearcut and amount of basal area removed before increases on water yield are measurable. Approximately 0.3 miles of new road construction proposed. Mitigations should limit any short or long-term cumulative effects on water quality and quantity.
3	Effects similar to Alternative 2, with no new road construction.
4	Effects same as Alternative 2

The cumulative effects area (CEA) for water resources is the Slippery Brook and McDonough Brook watersheds. This scale watershed was selected because at this scale the effects of multiple uses within the watershed could become additive and result in cumulative effects. As water flows downstream, pollutants are mobilized into the watershed, and changes in water yield and chemistry related to the project merge with other waters within the watershed. The outlet of the cumulative watershed boundary is the East Branch of the Saco River in the Slippery Brook watershed and the Little Cold River in the McDonough Brook watershed. This scale is large enough to integrate processes within the watersheds and gather the result to a single point at the outlet of each watershed.

Past and present activities that occur in the cumulative area watersheds include timber sales, recreation including trails, road maintenance and use, and activities on private land such as developments and roads. Future activities include the proposed action, additional activity in the private lands, continued recreation use, and ongoing road maintenance and use.

Private lands constitute 8% of the cumulative effects area, all of which is located in the McDonough Brook watershed. At present, water quality and changes to runoff as a result of activities on private land are not causing the river to exceed water quality standards. However, it is possible that future activities on this ownership could contribute to localized pollution effects if managed improperly.

In the McDonough Brook watershed, approximately 55 acres in the Langdon Brook Sale was treated in the past. Treatment type was single tree selection. In general, due to the limited nature of timber treatment practices, time between timber sales, and the use of BMPs, no measurable increases in water quantity are expected to be currently present in the watershed. Additions to water yield, as a result of the Chandler Round Vegetation Management Project would not be visible in the CEA. This is because less than 25% of the basal area in the CEA watershed is proposed for removal in all Action Alternatives. The White Mountain National Forest has no timber sales planned in the CEA in the next ten years.

To prevent cumulative effects on water quantity from generation of additional runoff resulting from timber harvest, the Forest Plan includes a standard and guideline that limits clearcutting in a 1,000-acre or larger watershed to 25% within a ten-year period (LRMP p. III-17). None of the Action Alternatives would approach the 25% limit for clearcuts in either the McDonough Brook or Slippery Brook watersheds, even when combined with previous sales. Alternative 2 proposes the largest amount of clearcutting. Selection of this alternative would result in only 2% of the Slippery Brook watershed and 2% of the McDonough Brook watershed being harvested by clearcut, cumulatively. Even if all of the *private* land within the McDonough Brook watershed were clearcut within the next decade, the standard and guideline still would not be exceeded.

As discussed previously, the open maintained roads are likely contributing to some changes in the routing of water and sediment transport processes where present. This effect increases with proximity to stream and/or degree of slope. Past, present, and future road activities on the forest are expected to continue in much the same way as present. About 15 miles of classified roads are present in the cumulative effects watersheds. Road density in the watershed is low, averaging 7.5 feet of road per acre for the 10,600-acre cumulative effects area.

Cumulative effects related to past, present, and future recreational activities in the cumulative effects area have not been observed or detected. Recreation use in this watershed is largely limited to roads, trails, and streams, with about seven miles of trails within the cumulative effects watersheds.

Within the cumulative effects area, there is a low risk of cumulative effects from any of the Action Alternatives on water quality, water quantity, or the condition of streams, riparian areas, or floodplains. Ground disturbance would be short-term in nature, and use of multiple mitigation measures would diminish or eliminate their possible effects.

3.4 Soils

3.4.1 Soil Erosion

Affected Environment

Chandler Round has soils common to the White Mountain National Forest. At elevations below 2500', which is the case in this proposed sale, soils are deep, well and moderately well drained, sandy loam tills on 10-25% slopes. It is too low on the landscape to have dry debris slides, which lead to mass movement of soil. It is low enough on the landscape to have deep soil slumps; however, field and photo review indicate this soil hazard does not exist here.

Near Slippery Brook soils are a mix of well drained, and moderately well drained, fine sandy loams favorable for spruce, fir and hemlock. These correspond to ecological types 11 and 115a. Pockets of poorly drained soil are intermingled in low-lying ground. Soils on the slopes of Chandler Mountain are deep, well drained, fine sandy loam tills ranging from 10-30% slopes. Here, ecological type 105d favors northern hardwood-spruce, while ecological type 105 favors northern hardwoods. Soils on the lower slopes of Round Mountain are a mix of ecological types 115a, 105 and 105d. Soil erosion hazard is low on ecological type 11, and moderate on 105d and 105 and high in 115a. There are no soils shallow to ledge in the proposed sale area. See Figure 10 for the Ecological Land Type Map.

Early land use records indicate the Chandler Round area was lightly harvested in about 1918 (Goodale 1999). At this time, the forest was recorded as mixed northern hardwoods and spruce. This fits with current ecological typing and forest typing in this vicinity.

Since that time, there has been conventional, bole-only forest harvesting in this area. Where clear-cutting occurred, regenerated stands now show adequate stocking. Intensive harvesting over time may deplete soil calcium, which may affect forest productivity. This concern centers on whole-tree harvesting. Tree tops and limbs account for about 50% of the calcium that resides in a sugar maple tree. Whole tree harvest is **not** proposed in the Chandler Round Sale. All tops and limbs will either remain in the forest.

The Analysis Area for direct and indirect effects on soil erosion is the MA 3.1 lands within HMU 505, encompassing 3,938 NF acres. All proposed activities are within this land base. Dry debris slides are not a risk for this project because they occur at elevations significantly upslope of the proposed area where no road or timber sale activity is planned.

Within the analysis area, roads and skid trails are the main concern for soil erosion because they may expose mineral soil (Patric). The act of cutting trees is not a source of soil erosion because it does not expose mineral soil (Hornbeck). Permanent, all season roads in the Project Area are maintained to Forest Plan standards that help prevent concentration of water on the road surface.

Forest Road 17 revealed that this one lane gravel road is well graded, the ditch lines are clean, culverts are operational and cut-banks are stable. There is no sign of accelerated soil erosion. Forest roads 17a, 17b, 17c and 17g are intermittent use roads, both summer and winter. Field inspection revealed that all are properly water-barred; seeded, as was necessary, that cut-banks are stabilized and there is no evidence of accelerated surface soil erosion.

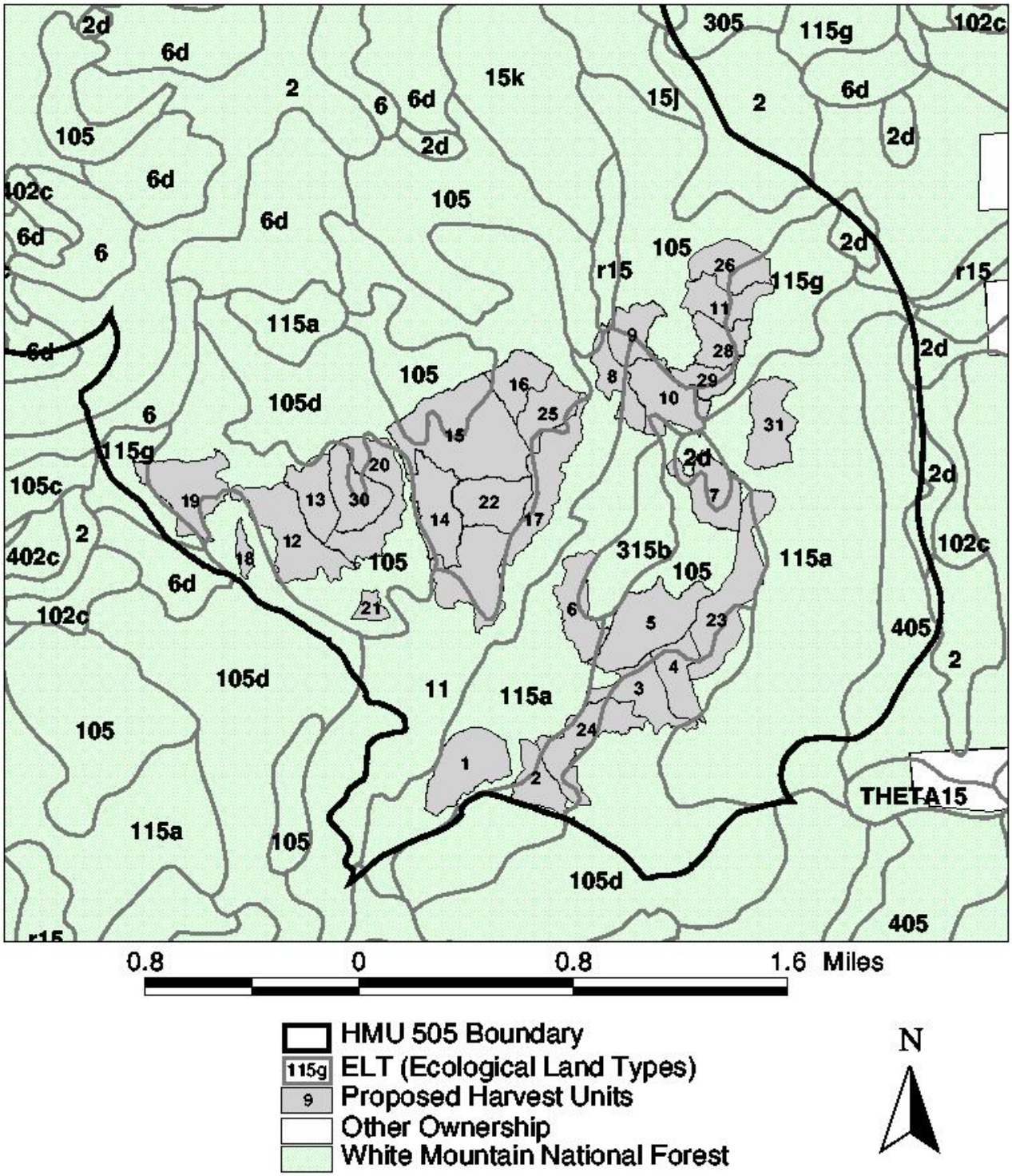

Figure 10:
Chandler Round Project
Ecological Land Types

Previously used haul roads and skid trails in the project area have re-vegetated or are becoming thick with saplings. Water-bars are in place. There is no evidence of accelerated soil erosion on these skid trails or roads. Previously used log landings have re-vegetated. There is no evidence of other ground disturbance except on foot trails.

Surface soil erosion is always a concern, especially related to road construction and skid trails. In the proposed Project Area, approximately 17% of the stands are soils with a low surface soil erosion hazard, 63% have a moderate soil erosion hazard and 20% have a high soil erosion hazard (LRMP at VII-F-3). Overall, soil erosion in eastern forests is not considered a problem when Best Management Practices (BMPs) are applied in a timely way (Martin et al). Field monitoring on the White Mountain National Forest supports this conclusion (2000 Monitoring Report).

Concentrations of water may cause channeling on road surfaces which can lead to soil erosion. Site visits to the Project Area found no evidence of channeling due to accelerated soil erosion. Intermittent seasonal use roads (those used occasionally for management purposes) were properly closed following their last use and have resulted in no accelerated soil erosion, though there may be instances of localized surface erosion. Evidence of minimal soil erosion in this vicinity supports research that soil erosion at managed forestry operations can be controlled through timely application of standards and guidelines (Martin et al). It is also consistent with other findings that eastern state forestlands can be managed so there is little or no increase in soil erosion (Patric).

Existing log landings from previous sale activity are well located and stabilized, and do not show signs of soil erosion based on field inspection. They are not considered a significant source of soil erosion (Stone), but may sometimes present concerns about soil compaction. However, research reveals that soil bulk density of landings returns to pre-harvest densities two to three years following harvest (Donnelly et al).

Site visits also shows that forest soils within the project area are well covered with feaf litter and duff. This layer is a factor in determining the current species composition of natural regeneration within these stands. Future species composition will also be determined to a large extent on the amount of exposed mineral soil. Harvest activities that expose 10 to 20 percent of the soils, intermittently throughout a treatment area, such as on skid trails or where trees were dragged to a skid trail, have little effect on soils, or soil movement, but may affect the ability for species such as sugar maple, white ash, and red oak to establish within the stand.

Units 1, 2, 3, 4, 6, 7, 10, 11, 12, 13, 15, 16, 20, 21, 23, 24, 26, 28, 29 and 30 are in a semi-closed canopy condition due to moderate to severe ice damage. Natural regeneration in these units includes an abundance of advanced beech regeneration that is likely to out-compete the sugar maple, ash and oak seedlings. Sugar maple, ash and oak seedlings are limited by canopy conditions and in some locations, are absent. Soil scarification during non-frozen soil conditions would aid the germination and establishment of these species, and the stands eventual recovery of a diverse species mix. Stand health and resistance to insects and disease is increased with species diversity, and over time provides a safety net against future catastrophic biotic events. To achieve this objective, harvest operating seasons should allow for soil scarification.

3.4.1.1 Direct & Indirect Effects on Soil Erosion

Summary of Direct & Indirect Effects on Soil Erosion

Analysis Area	Time Period	Estimated Acres
National Forest lands within project area designated as MA 3.1 in HMU 505	Present	Approximately 3,938 NF acres

Alternative	Summary of Direct & Indirect Effects
1	Some localized soil erosion due to ongoing maintenance of Forest roads
2	Soil erosion potential associated with road 0.3 miles of new construction & up to eight miles of restoration maintenance, and on up to 10% of harvest treatment acres where soil disturbance might occur (10% of 718 acres of summer and fall harvest units).
3	Soil erosion potential associated with 3.5 miles of restoration maintenance, and on up to 10% of harvest treatment acres where soil disturbance might occur (10% of 314 acres of summer and fall harvest units).
4	Similar to Alternative 2, slightly fewer acres of summer harvest potential and same miles of road restoration maintenance and new construction.

General effects of timber harvesting on soils can be found in the Forest Environmental Impact Statement, pp. IV-30 - 32.

Alternative 1: No Action Alternative

Alternative 1 may have localized soil erosion related to on-going maintenance of permanent, all season Forest roads. In the absence of activities such as timber harvesting, and road construction and restoration, Alternative 1 will have no direct or indirect effects from soil erosion that typically results from these activities.

Alternative 2: Proposed Action

Direct effects

Use of Forest Road 17 is common to all action alternatives. No accelerated soil erosion is expected in any alternative because it is constructed to a standard that properly manages surface water, ditches and culverts are adequate, cut-banks are stabilized, and maintenance of all such facilities will occur before and during the life of sale activity.

Forest Roads 17b 17d, and 17g are common to all alternatives. These existing roads will be used for summer, fall and winter haul, depending on rainfall, and how moisture impacts harvesting and road conditions. In the snow-free season, some rutting of these roads is likely. Site-specific, localized temporary soil erosion may occur. However, timely sale administration will prevent this leading to accelerated soil erosion. Ditches, culverts and road locations are designed to successfully manage surface water to prevent stream sedimentation. Winter use of these roads will not lead to soil erosion. Proper closeout at sale completion would prevent soil erosion as has been the case to date.

Restoration maintenance of Forest Road 17a is proposed for Alternatives 2 and 4. In both alternatives, a secondary new spur is proposed for distance of 0.3 miles. The extension is on deep, well drained soils. Use of this road in the summer, fall and winter will have soil erosion impacts similar to those described for Forest Roads 17b, 17d and 17g. Construction of this road would expose mineral soil and would likely cause limited, on-site soil erosion. However, construction of this road on-the-contour on well drained soils is not likely to lead to accelerated soil erosion with ruts and channels.

Alternatives 2 and 4 have the greatest potential magnitude for soil erosion, Alternative 1 has the least and Alternative 3 is midway. Soil erosion is generally not an issue with proper road construction and use on these deep well-drained soils. There are no extraordinary soil hazards, such as debris slides or slumps.

Indirect Effects

Sedimentation of streams is the most likely indirect effect from road construction, use or skidding. See *Water Quality Section* for a discussion of water quality.

The potential effect of timber harvesting on forest productivity is indirect. The Forest Service has a responsibility for the long-term productivity of the land. Measurement of northern hardwood forest plots since 1931 at the nearby Bartlett Experimental Forest does not indicate statistically distinguishable change forest productivity due to human impacts, even including the impacts of acid deposition (Nuegenkapian, 1998). The Bartlett Experimental Forest, relative to other locations across the White Mountain National Forest, would be considered a calcium poor site based on the till source model (Bailey, 2001). Bartlett has experienced a variety of timber harvests on a suite of different soils, and previously was impacted by agriculture and other land uses. Examination of sites across the White Mountain National Forest using remote sensing technologies confirms the same results (Smith 2000). A review of biomass accumulation studies across the forest using clear-cutting, even whole tree harvest clear-cutting, does not indicate a concern about soil calcium (Fay, Leak 1997). No published data indicate regional growth declines of hardwood species due to base cation losses (Adams et al 2000). Indirect effects are not expected on forest productivity from harvesting activities in the Chandler Round Sale.

All former clearcuts in the Chandler Round vicinity have regenerated following harvest. Forty acres were identified as having been browsed heavily by moose and remain in an early successional condition despite adequate stocking. Sometimes there is a concern that organic matter is being lost, and that this might have indirect nutrient consequences. However, it has been found that soil organic matter is not lost from harvest sites, even those clear-cut, instead it is re-distributed in the upper mineral layers during harvest (Johnson et al 1991; Johnson et al 1997).

3.4.1.2 Cumulative Effects on Soil Erosion

Summary of Cumulative Effects on Soil Erosion

Analysis Area	Time Period	Estimated Acres
Cumulative Effects Analysis Area for Water Resources (Slippery Brook and McDonough watersheds)	1994-2004 Present 2004-2014	Approximately 10,600 acres of private and public lands

Alternative	Summary of Cumulative Effects
1	Low potential for cumulative soil erosion because no new activities would occur, and only 4 acres removed in past ten years. Incremental impacts from ongoing road maintenance, trail use, and natural events on National Forest lands are likely to be very limited.
2	Low potential for cumulative soil erosion because of project design and mitigation measures for this project, lack of planned future projects, and only 4 acres removed in past ten years. Any incremental impacts from road maintenance, trail use, and natural events on National Forest lands are likely to be very limited. Mitigations limit effects to those anticipated and analyzed in 1986 Forest Plan FEIS
3	No new construction, less than half the road restoration, well fewer acres in summer and fall harvest, and past and futures impacts the same as in alternative 2.
4	Similar to Alternative 2; slightly fewer harvest acres. New road construction and road restoration maintenance would be the same as alternative 2.

The Analysis Area for cumulative effects on soil erosion is the Cumulative Effects Area used for water resources (see Section 3.3.4). It encompasses 10,600 acres, including private and public lands in Slippery Brook and McDonough Brook watersheds. Land management activities such as harvesting, and road construction and restoration typically result in site-specific soil erosion that is generally limited to the area of impact. However, since the effects of soil erosion are often of greatest concern in streams and rivers, this analysis of cumulative effects considers cumulative incremental impacts on watersheds. The cumulative effects analysis includes activities from ten years in the past to anticipated future projects over the next 10 years.

Cumulative soil erosion impacts within the Analysis Area are generated primarily from past timber harvesting on public and private lands, road maintenance on public and private roads and parking lots, and the Stony Brook residential development.

3.4.2 Soil Calcium

Affected Environment

Research at the Hubbard Brook Experimental Forest on the White Mountain National Forest indicates there is a concern about soil calcium loss from atmospheric deposition and timber harvest (Federer 1989), and possible impacts on long-term forest productivity, health and composition. Related summaries appear elsewhere (Schaberg et al., 2001; WM Monitoring Report 2000, pp. 43-50).

Soils within the Project Area are deep and moderately or well drained. There is one stand on outwash sand soil. In general, soil calcium concentrations are expected to be relatively low in this southeastern portion of the Forest. This is based on the current version of the till source model. The till source model is a cooperative effort to characterize base cations, including calcium, across the White Mountain National Forest (See map in Project File). The model is currently going through verification based on actual soil chemistry measurements at 40 long-term soil monitoring plots representing the range of soil calcium expected on the White Mountain National Forest.

Soil calcium in the Project Area has probably been affected by atmospheric deposition and early timber harvest. Based on research at Hubbard Brook, it was originally estimated that 4.6% of the total soil calcium may have been lost since 1950 when acid rain began in earnest (Federer 1989)[1]. Using updated information that includes mineral weathering (Likens et al., 1998), this number can be reduced to about 1.8%[1]. Land use records indicate the Chandler Round area was harvested in the early part of the 1900s, and that the stands were "lightly culled" (Goodale, 1999). This would translate into about a <1% loss of soil calcium (Fay et al., 1993). The history of all stands is not known, but large portions of this vicinity were treated this way. It is estimated, therefore, that about 2.8% of the total soil calcium may have been lost due to atmospheric deposition and timber harvest up to today.

The timber sale program for the White Mountain National Forest, including sales such as Chandler Round, has been in the range of 20-24 MMBF per year. This is about 1/3 of the long term sustained yield on suitable timberland on the Forest, which was estimated at 69 MMBF (1986 Forest Plan FEIS). This shows that current growth far exceeds harvest, and that overall, interruption of the calcium cycle by harvesting is relatively infrequent and widely spread. Second, rotation length where clear-cutting is proposed in northern hardwoods is 120-years between harvests. This is not only consistent with silvicultural guides, but also, does not raise the level of concern for management of National Forest lands to the same level as is sometimes expressed when rotation lengths are short, such as 40-years (Federer et al., 1989). Third, there is no proposal, in this case, to practice whole-tree harvest; therefore, from the outset, approximately 1/3 of the calcium that might be removed would remain on site for re-cycling into the ecosystem (see Project File, Sugar Maple Biomass and Calcium Content, provided in Response to Comments, Appendix G). And finally, based on Pnet:BGC modeling at Hubbard Brook Experimental Forest, atmospheric deposition is by far the largest factor in potential changes in soil base saturation and exchangeable soil calcium as compared to forest harvesting (Solomon et al., 2003).

The Analysis Area for direct, indirect and cumulative effects to soil calcium is the harvest units. Site-specific soil impacts related to soil or forest productivity is not likely to extend further. The time span for this analysis is from early harvesting at the beginning of the 20th century to 20 years into the future, which is a reasonable planning horizon given possible improvements in air quality. Early harvesting is considered because land use history affects soil nutrients, including calcium. The Project Area is

composed of second-growth hardwood forest, regenerated from around 1900. It is typical northern hardwood forest for the White Mountain National Forest.

Harvest and removal of forest products takes away calcium that would otherwise be recycled to the forest floor. Clear-cut harvest by conventional bole-only harvest removes approximately 187 Kg/ha of calcium that equates to approximately 2% of the total soil calcium supply. Thinning and singletree selection removes 44 Kg/ha that equates to less than approximately 1% of the total calcium supply in the soil. The acres of clear-cut and singletree or thinning by alternative on the Chandler Round Sale are as follows:

3.4.2.1 Direct & Indirect Effects on Soil Calcium

Summary of Direct & Indirect Effects on Soil Calcium

Analysis Area	Time Period	Estimated Acres
Project Area (proposed cutting units)	Present	Alt 1 (0ac), Alt 2 (976 ac), Alt 3 (380 ac), Alt 4 (927 ac)

Alternative	Summary of Direct & Indirect Effects
1	Current levels of soil calcium would be maintained, Retained soil buffering capacity may help minimize or avoid effects to forest productivity, species composition, and forest health from acid deposition
2	Current levels of soil calcium would potentially be reduced by 2% on 200 acres, and by less than 1% on 776 acres, Reduced buffering capacity of soil due to calcium loss may effect ability to neutralize acid deposition
3	Current levels of soil calcium would potentially be reduced by 2% on 52 acres, and by less than 1% on 293 acres, Reduced buffering capacity of soil due to calcium loss may effect ability to neutralize acid deposition
4	Current levels of soil calcium would potentially be reduced by 2% on 121 acres, and by less than 1% on 791 acres, Reduced buffering capacity of soil due to calcium loss may effect ability to neutralize acid deposition

Alternative 1: No Action Alternative

Because timber harvest would not occur in Alternative 1, the current supply of soil calcium within the Project Area would be available to buffer impacts from acid deposition.

Action Alternatives 2-4

Harvesting activities in Alternatives 2, 3 and 4 would contribute to potentially lowering the buffering capacity of the soil. Clearcut harvests lead to an estimated 2% loss of soil calcium from a single entry, (bole-only harvest) in northern hardwood forest (Fay et al 1993). Clearcuts have a greater short-term effect on soil calcium loss because more biomass is removed from the site and harvest-induced leaching occurs when this intensity of harvest occurs. Single-tree selection, thinning and group cut leads to a <1% loss of soil calcium from a single entry, bole-only harvest in northern hardwood forest because so much less wood is removed (Fay et al 1993). Differences among the Action Alternatives relate to the proportions of these two categories of harvest, and the acres harvested.

Table 14. Acres of Clear-cut or Other Harvest By Alternative.

Method	Alternative 1 (Acres)	Alternative 2 (Acres)	Alternative 3 (Acres)	Alternative 4 (Acres)
Clear-cut	0	200	52	121
Other	0	776	328	806

The no action alternative has no direct impact on soil calcium because there is no harvest. The direct effects of timber harvest can be compared for the Action Alternatives by estimating calcium loss by acres proposed for each management system. Alternative 2, which proposes the most acres of even-aged harvest (including 200 acres of regeneration clearcuts and 10 acres of wildlife openings), would experience the largest potential soil calcium depletion of the Action Alternatives. Alternative 3, which proposes the fewest acres of even-aged harvest (52 acres of regeneration clearcuts and 10 acres of wildlife openings), would experience the lowest calcium depletion of the Action Alternatives. Alternative 4 proposes fewer acres of even-aged harvest than Alternative 2 (including 121 acres of regeneration clearcuts and 10 acres of wildlife openings), has similar but less potential soil calcium depletion than Alternative 2.

3.4.2.2 Cumulative Effects on Soil Calcium

Summary of Cumulative Effects on Soil Calcium

Analysis Area	Time Period	Estimated Acres
Project Area (proposed cutting units)	1900-2003 Present 2003-2013	Varies by Alternative Alt 1 (0ac), Alt 2 (976 ac), Alt 3 (380 ac), Alt 4 (927 ac)

Alternative	Summary of Cumulative Effects
1	Current levels of soil calcium may be maintained, retained soil buffering capacity may help minimize effects to forest productivity, species composition, and forest health from acid deposition
2	Most cumulative soil calcium depletion due to most acres in even-aged harvest, but not enough depletion to have long term effects on soil productivity
3	Less depletion than Alternative 2 because of fewer acres in even-aged harvest
4	Less depletion than Alternative 3 because of fewer acres in even-aged harvest

Alternative 1: No Action Alternative

The cumulative effect of calcium depletion under the No Action alternative includes an estimated <1% (land use history) + 1.8% (acid deposition up to 2000) + 0.7% (future acid deposition) = 3.5% estimated soil calcium loss. Acid deposition is likely to continue to occur within the Analysis Area for the next 20 years, hence the estimated 0.7% depletion in soil calcium over that time shown in the formula above. However, improvements in air quality may diminish the magnitude of this estimate.

Action Alternatives 2-4

The cumulative effect of calcium depletion on the stands proposed for harvest includes an estimated >1% (land use history) + 1.8% (acid deposition up to 2000) + 2% (proposed harvest) + 0.7% (future acid deposition) = 5.5% on those acres prescribed for clearcuts within each alternative. In those cases when other methods are applied (e.g. single-tree, thinning, small groups), the proposed harvest value would change from 2% to <1%, reducing the cumulative calcium depletion to 4.5%. When applying these percentages to the Action Alternatives, it is evident that the largest cumulative depletion of soil calcium would potentially occur in Alternative 2, which has the most acres of clearcuts. The lowest cumulative depletion would occur in Alternative 3, with the fewest acres of clearcuts. These estimates must be tempered by other factors affecting our understanding of the calcium cycle.

First, we have learned much more about the calcium cycle from research at the Hubbard Brook Experimental Forest since the original estimates were made in 1989 (Likens et al., 1998). It is now possible to include mineral weathering in the soil calcium loss estimates, and this indicates that soil calcium losses have declined substantially compared to original estimates (Federer et al., 1989). (see Appendix G).

In addition, there is now research taking place by Forest Service and University scientists on calcium oxalate, which has never been accounted for in the calcium budget (Bailey, Pers. Comm), and can lead no where but further decreasing current depletion estimates. There is also research taking place on National Forest lands exploring apetite feldspar as another possible unaccounted for source of soil calcium (Hamburg et al., 2003). Both the calcium oxalate and feldspar studies are directly applicable to the White Mountain National Forest.

With respect to these new possible sources of soil calcium, the research related to appetite feldspar (non-silicate minerals) reveals that young forests are apparently accessing calcium from the soil from sources other than those traditionally considered. This research suggests the potential for acid deposition to deplete calcium is greater in old stands, than young stands (Hamburg et al., 2003). But also, relevant to how the magnitude of effects are characterized in this and other analysis, it is a reminder not to be too tempted by the apparent simplicity of small watershed mass balance studies when other mechanisms (biological) may cast significant new light on the potential impacts.

Second, there is direct measurement evidence, pre- and post-harvest, where whole-tree cutting was used with a clear-cut in a northern hardwood stand on basal till soils. It shows that exchangeable soil calcium pools have not changed over an eight year period post harvest at the Hubbard Brook Experimental Forest (Johnson et al., 1997). The authors report that "it is clear that whole-tree harvest clear-cutting has not significantly depleted exchangeable nutrient cation pools on W5 (watershed) 8 years after clear-cutting. We spoke very recently to the scientist involved, and he shared that re-measurements were made in 1998, representing 15 years post original harvest, and that these measurements yield the same results (Johnson, Personal Communication). In other words, when you actually make direct measurements of the soil pre- and post-harvest, as compared to inferred changes based on small watershed studies, the evidence does not support a change in exchangeable soil calcium. It is this exchangeable calcium that is used by trees to support their growth. This, of course, underscores the importance of making direct observations to better understand the actual impacts on terrestrial ecosystems.

Third, calcium depletion is a dynamic problem where factors such as improvements in air quality will incrementally change the outcome over time. The measurements on small watershed studies (Federer et al., 1989) represent a static view of these relationships that has been a really good starting point, but it does bring with it some cautions in application of the information because improvements in some aspects of air quality are occurring since passage of the Clean Air Act (Likens et al., 1996). This is why dynamic models such as Pnet:BGC may prove more useful in trying to estimate changes in the soil calcium pool. This is not only important to estimating changes in base saturation or exchangeable calcium over time. It is also important because it helps underscore work on stream water chemistry related to possible impacts from acid deposition. Particularly, long-term response studies at Hubbard Brook show a hysterisis pattern, meaning that recovery from acid deposition impacts to streams is possible (Likens et al., 1996).

3.4.2.3 Changes in Forest Productivity

Two studies done on the White Mountain National Forest are especially pertinent. First, there has been an analysis of biomass accumulation and growth trends at sites with long-term measurements, including information pre- and post-industrialization (Nuengsigkapian, 1998). And second, there has been a complimentary study that expands and supports the earlier one (Smith et al. 2002). Both studies focus on forest productivity measured in terms of biomass, which is a common unit of measure for this kind of analysis. Both studies include areas where there had been previous timber harvest. Both include northern hardwood forest.

Nuengsigkapian's study sought to determine if rates and trends in forest productivity show change in trends over time in the face of the region-wide influence of such factors as acid (SOx) deposition, nitrogen deposition and other recent anthropogenic effects. All study plots are in the White Mountain National Forest, and include the Bartlett Experimental Forest, Hubbard Brook Experimental Forest, Bowl Research Natural Area, Campton Agricultural Plots and Waterville Valley. All data was from stands which have remained unmanaged since the time of first data collection. It incorporates an 81-year and 150-year chrono-sequence of unmanaged stands to determine long-term patterns of biomass accumulation. Details of methods and site conditions can be found in the report.

There are three relevant findings important to the question at hand. First, stands of similar age pre- and post-industrialization have similar rates of growth and biomass values at the same ages. A good example is that the Bartlett Experimental Forest even-age stands at age 100-150 have reached biomass values similar to all-aged stands measured in 1931 when their ages were 150-190. Second, these same all-aged stands have a similar level of productivity compared to the reference old growth stands at the Bowl Research Natural Area and Waterville Valley. And third, these similarities are despite differences in latitude, elevation, soils and geology. Nuegsigkapian concludes that because biomass values reached by older, even-aged stands today are comparable to old growth forests before WWII industrialization, it is not apparent, based on conventional forest mensurational techniques, that trends in biomass accumulation have changed over time. This analysis was guided by Dr. Steven Hamburg at Brown University, and Dr. Marie-Louise Smith and William Leak at the USFS Northeast Research Station, Durham, N.H.

Smith et al. (2002) sought to directly estimate aboveground forest productivity using a combination of inventory plots at the Bartlett Experimental Forest and Forest Inventory and Analysis Plots across the White Mountain National Forest. This incorporated a wide range of vegetation, soils and elevation. In this case, there was measurement of forest plots at different times to calculate both standing biomass and biomass accumulation rates (ANPP). These measures were compared with a remote sensing based estimate of forest productivity for the WMNF derived from a significant and highly predictive relationship between foliar nitrogen concentration and forest growth. While the purpose of Smith's work was unrelated to the impacts of atmospheric deposition, it was instead to derive spatially explicit estimates of forest growth rates over large area's, it is still information relevant for our purpose. It is also relevant because it, too, estimates productivity. In other words, this is a useful cross reference to the plot data from Nuengsigkapian. Plus, it affords the opportunity to say something definitive about locations all across the White Mountain National Forest. The plot data derived by Nuengsigkapian leads to an estimate of productivity of 3.99 Mg/ha/yr ($\pm$ 0.66 Mg/ha/yr) while results from Smith lead to an estimate of 3.48 Mg/ha/yr ($\pm$ 0.96 Mg/ha/yr). The findings by Smith in terms of biomass accumulation at any given age are not statistically different from those derived from the plot based study of

Nuegsigkapian. In other words, starting with the detailed plot work based solely on on-the-ground measurements, and expanding to the scale of the whole forest based on the plot/imagery assessment, it is possible to say at this broad scale that productivity remains unchanged on the White Mountain National Forest since the early 1900's. There is nothing about the forest type, land use history, soils, geology or elevation at Chandler Round that is extraordinary or in some way substantially different that the wide range of plots in these two studies.

Based on these studies, we have no reason to suspect, therefore, that any of the alternatives contemplated in our environmental analysis, even in the face of atmospheric deposition, will lead to any change in forest productivity. In fact, a separate review of even-age timber stands in the Conway area where Chandler Round is proposed, including clear-cut and whole-tree harvest, demonstrates that these harvested areas have biomass accumulation consistent with the biomass curve derived on the detailed plot data at the Bartlett Experimental Forest (Leak, Fay 1997). Further research about forest productivity is summarized elsewhere indicates sugar maple growth had been constant or increasing (Smith et al 1990; Hornbeck, 1987). A productive forest is likely to be a healthy forest.

3.4.2.4 Changes in Forest Health

Forest health is usually characterized in terms of decline, such as branch or twig dieback, and mortality, or death. The National Acid Precipitation Assessment Report Program (1998), which represents the consensus among recognized scientists working in this field, is an important source on this topic. High elevation spruce-fir remains considered sensitive soil systems, and are the central concern with respect to acid deposition. This relates to significantly greater atmospheric deposition at high elevations (Miller et al., 1993). The White Mountain National Forest does not harvest timber in high elevation spruce-fir forest, including the proposed Chandler Round Project. Therefore, this aspect is moot.

This project does, however, propose to harvest timber in eastern hardwoods; specifically, the northern hardwood forest. The 1998 NAPAP Report indicates the eastern hardwood ecosystems are not considered sensitive ecosystems, and that soil sensitivity varies. In general, it reports that the eastern hardwood forest has not been shown to be adversely affected by acid deposition. However, they also point out that broad-scale monitoring has not been conducted to confirm this finding. We reviewed the most relevant paper cited for forest health (Likens et al. 1996), and no observations, positive or negative, are made about forest health impacts at the Hubbard Brook Experimental Forest. It does report that annual biomass accumulation at HBEF has declined unexpectedly to a small rate since 1987, perhaps because available calcium became limiting to forest growth. This, however, is not only in stark contrast to the detailed studies already described; but also, it is based on the Jabowa Model for which there is no supporting field data. It is no surprise at Hubbard Brook that biomass accumulation peaks about 80-years because this is absolutely consistent with well documented field evidence (Nuengsigkapian, 1998; Smith et al., 2002; Leak, 1982). In fact, in all the reading we have done on this topic, we found no research or discussion about changes in forest health a Hubbard Brook Experimental Forest. The species of most interest with respect to forest health is sugar maple because it is a "calcium pumping" species that apparently relies heavily on soil calcium. Sugar maple is found at the Chandler Round Timber Sale Area**.**

Species composition is also a possible indicator of change in forest health (Leak, 1992). The basic idea is that changes in soil nutrition would lead to changes in species composition because site conditions had

changed. Research at the Bartlett Experimental Forest where the till source model shows calcium concentrations are at the low end compared to other parts of the White Mountain National Forest, does not show significant shifts in species composition (Leak, 1992). At the Chandler Round Sale Area, there are some excellent northern hardwood stands with large mature sugar maple. In these same stands, there is a rich under-story of sugar maple regeneration. This would be expected because the ecological land type in these areas would be expected to support a continuing composition of northern hardwoods, including sugar maple. The point is that species suitable to this site are replacing the over-story species, indicating a return to existing species composition. Therefore, site-specific species composition trends supported by relevant research findings, does not support any concern about forest health.

A regional transect of forest health plots for sugar maple indicated some evidence of branch dieback at a few sites located on the White Mountain National Forest (Hallett et al Unpublished). Whether or not this is directly related to soil acidification is uncertain. Many environmental stressors might contribute to qualitative evidence of branch dieback including drought, insects and disease (Horsley et al., 2000). In addition, it is clear that the focus in forest health and sugar maple is in western New York and Pennsylvania (Driscoll et al., 2001, Horsley et al 2000). Personal communication with one of the authors of the upcoming NAPAP Report, which has been in review for about two years, indicated that no findings substantially different than the above for sugar maple and eastern hardwoods are expected at this time.

Despite the fact that there is little evidence of sugar maple decline on the White Mountain National Forest, The Forest has invoked a cooperative effort with the Northeast Research Station in Durham, N.H. to monitor and implement research on northern hardwood health and productivity, including sugar maple, consistent with the NAPAP (1998) recommendations. Specifically, we have systematically installed 40 long-term monitoring and research sites on the White Mountain National Forest. Sites were selected to represent northern hardwood, 60^{+}years old, similar soils and slope position, but different soil calcium concentrations based on our till source model. The Forest has already done soil chemistry, soil description, and foliar calcium determinations. In addition, this summer we are installing net primary productivity plots and will do forest health measurements based on the sugar maple protocol. These sites will serve as long-term soil quality monitoring sites, and research sites for more in-depth examination of foliar and soil calcium and forest health. To date, foliar chemistry measurements at some sites indicate it may be below the current scientific understanding of thresholds; however, as pointed out in NAPAP 1998, the multiple stressors paradigm involved in acid deposition can make cause and effect relationships difficult to separate out.

In summary, there is no evidence that would lead to a conclusion that there would be a forest health impact based on the cumulative effects of acid rain and timber harvest at the Chandler Round Timber Sale. In addition, interdisciplinary team field reconaissance in the hardwood stands proposed for harvest showed no evidence of mortality that appeared unusual. Stocking surveys for all previous clear-cut harvest units in the vicinity of Chandler Round, and across the White Mountain National Forest, over the past 23 years; show that with the exception of some impacts from moose browsing, all clear-cuts have successfully regenerated back to forest. Furthermore, research at the Hubbard Brook Experimental Forest demonstrated successful regeneration post clear-cut in northern hardwood forest (Martin et al 1989), as is also the case at the Bartlett Experimental Forest (Leak 2004). Bartlett Experimental Forest is especially important because this lies within the area where our till source model and soil chemistry measurements indicate soil calcium concentrations are the least compared to other locations on the White Mountain National Forest. Finally, on-site visits at all forty till source plots, which are northern

hardwood forest on a range of soil calcium concentrations, including scientists who work in the area of forest health monitoring, found no apparent evidence of unusual health or mortality. These same sites are being re-visited this field season to make systematic observations about forest health.

3.4.2.5 Integrated Cumulative Effects

Forty years have elapsed in the development of the calcium budget for small watersheds in the northern hardwood forest. This has been summarized for Hubbard Brook Experimental Forest (Likens et al 1998). While it is reported that it is difficult to quantify the extent of calcium depletion over time (Schaberg et al., 2001), in fact, small watershed studies have tried to quantify the magnitude of impact (Federer et al., 1989). Original estimates indicated the magnitude was potentially substantial (Federer et al.,. 1989), especially if short rotation harvest by whole-tree removal was applied. However, re-calculation with new information indicates a significantly smaller magnitude (Fay, 2004). Even more current research is likely to lead to discovery of previously unaccounted pools of soil calcium (Hamburg et al., 2003), which will in all likelihood further diminish the estimated quantities of depletion. Modeling indicates that acid deposition is apparently far more important to estimated changes in soil base saturation and exchangeable calcium than forest harvesting (Solomon et al., 2003). This is probably especially true when short rotation, whole-tree removal, is not the harvest practice.

Despite all the concern about soil calcium depletion, the overall threat it poses to forest health is largely unknown (Schaberg et al., 2001). However, and significantly, the need for long-term forest productivity monitoring and evaluation (Schaberg et al., 2001) has been accomplished (and measured) in terms of trends in biomass accumulation based on measurements since 1931 (Neungsigkapian, 1998) and remote sensing (Smith et al., 2002). This research by Forest Service and University scientists makes it clear that because biomass values reached by older, even-aged stands today are comparable to old growth forests before WWII industrialization; and, it is not apparent, based on conventional forest mensurational techniques, that trends in biomass accumulation have changed over time.

The Clean Air Act (1970) and its amendment has led to reduction in sulfur deposition (Likens et al 1996). This positive improvement will contribute to reducing soil acidification, since as previously reported, acid deposition is the most significant factor in estimates of changes in soil base saturation and exchangeable calcium (Solomon et al., 2003). While historically there was a concern that nitrogen was a limiting factor in forest productivity, the more recent concern has been about nitrogen saturation (Aber et al., 2003). The concern here is that nitrogen deposition will also acidify soils. The expectation is that nitrogen saturation would lead to an increase in nitrate in stream water. Long-term measurement of stream water chemistry on the White Mountain National Forest, however, has revealed that re-measurement of nitrates (nitrogen) has instead shown a decline (Goodale et al., 2003). This suggests that nitrogen saturation may well not be the concern originally envisioned. Various possible explanations for the decline have been provided. Nitrogen deposition has remained relatively constant over time (Likens et al., 1996; Solomon et al., 2003).

Where decline in sugar maple health is reported, it is always noted that while soil calcium (or other base cations) may pre-dispose a site to decline (dieback or mortality), other stress factors are involved (e.g. drought, insect defoliation) (Horsley et al., 2000). Insect infestations in northern hardwood forest are not common (Millers et al., 1989). While there is occasional agricultural drought, perhaps every 3-5 years, it is generally site specific (Federer 1980). Most would agree that rainfall in New England is adequate and well distributed.

3.5 Recreation

Issues Related to Recreation

- Clearcuts along Slippery Brook Trail
- Temporary winter closure of Slippery Brook Road to snowmobiles

Affected Environment

Recreation resources within HMU 505 include one hiking trail and three snowmobile trails. The southern end of the approximately 6.5 mile long Slippery Brook Trail begins 7 miles from NH16A on FR17 (Slippery Brook Road). The trail is currently located on FR17 for the first 2.5 miles from its southern trailhead.

Previously, the trail was located along Slippery Brook in this section; however flood events in 1995 necessitated it be relocated to FR17. Evidence of previous vegetation management activity is noticeable along this portion of the trail. Shortly before FR17 meets Slippery Brook, the trail leaves the road and continues north eventually connecting to the Eastman Mountain and Baldface Circle Trails. The Slippery Brook Trail is used by hikers and mountain bikers and is classified as low use, defined as 0-6 people utilizing it per day during peak use. Monitoring during the summer and fall of 2003 supported this classification and indicated use between 0 and 4 people per day.

Three designated snowmobile trails lie within the project area: Switchback, Slippery Brook, and the Bradley Brook snowmobile trails. However, the Bradley Brook Snowmobile Trail is not maintained for use. A portion of the Slippery Brook Road (FR17) is utilized as a snowmobile trail, as well as Forest Roads 17C and 17D, which are part of the Switchback Trail. Both the Slippery Brook and Switchback Snowmobile Trails receive moderate use during peak season.

Slippery Brook Road provides access to the East Branch spur, and to Switchback trail**.** East Branch spur (NFSR 38) Slippery Brook trail and access to Chatham on Switchback trail would be impacted during winter logging. The narrow width of Slippery Brook Road prevents both uses.

3.5.1 Direct and Indirect Effects on Recreation

The Analysis Area for direct and indirect effects on recreation is displayed in Figure 11 and defined as:

- Sharing eastern, northern and western boundaries with the Chandler Round Project Area
- Including FR17 south to its junction with FR234 (Burnt Knoll Rd)
- Including FR38 East Branch Road and East Branch Trail
- Including Mountain Pond Loop Trail

Recreation settings for this recreation analysis area are described by the Recreation Opportunity Spectrum (ROS). ROS defines a range of unique recreation experiences as: Primitive, Semi-Primitive

Nonmotorized, Semi-Primitive Motorized, Roaded Natural and Rural (Forest Plan, pp VI-9). The lands with this area fall into MA 3.1, which is classified primarily as Semi-Primitive Motorized, but lands within this MA may also provide Semi-Primitive Nonmotorized and Roaded Natural recreation opportunities. Timber harvest has occurred in the Project Area in the past, therefore the long-term recreation experience is not expected to change as a result of vegetation management actions proposed in this document.

Summary of Direct and Indirect Effects on Recreation	
Alternative	**Summary of Direct & Indirect Effects**
1	• Would not alter current recreation opportunities
2	• Increased noise and traffic associated with harvesting; • Changes to forest landscape along some roads and trails; • Temporary interruption of access to snowmobile trails during winter logging operations; • Improved habitat and browse for some game species
3	Similar to Alternative 2 except: • Less noise, traffic and changes to forest landscape : • Slippery Brook Road not restored; • Significantly less improved habitat and browse for some game species
4	Similar to Alternative 2 except: • Slightly less noise, traffic and changes to forest landscape • Less improved habitat and browse for some game species

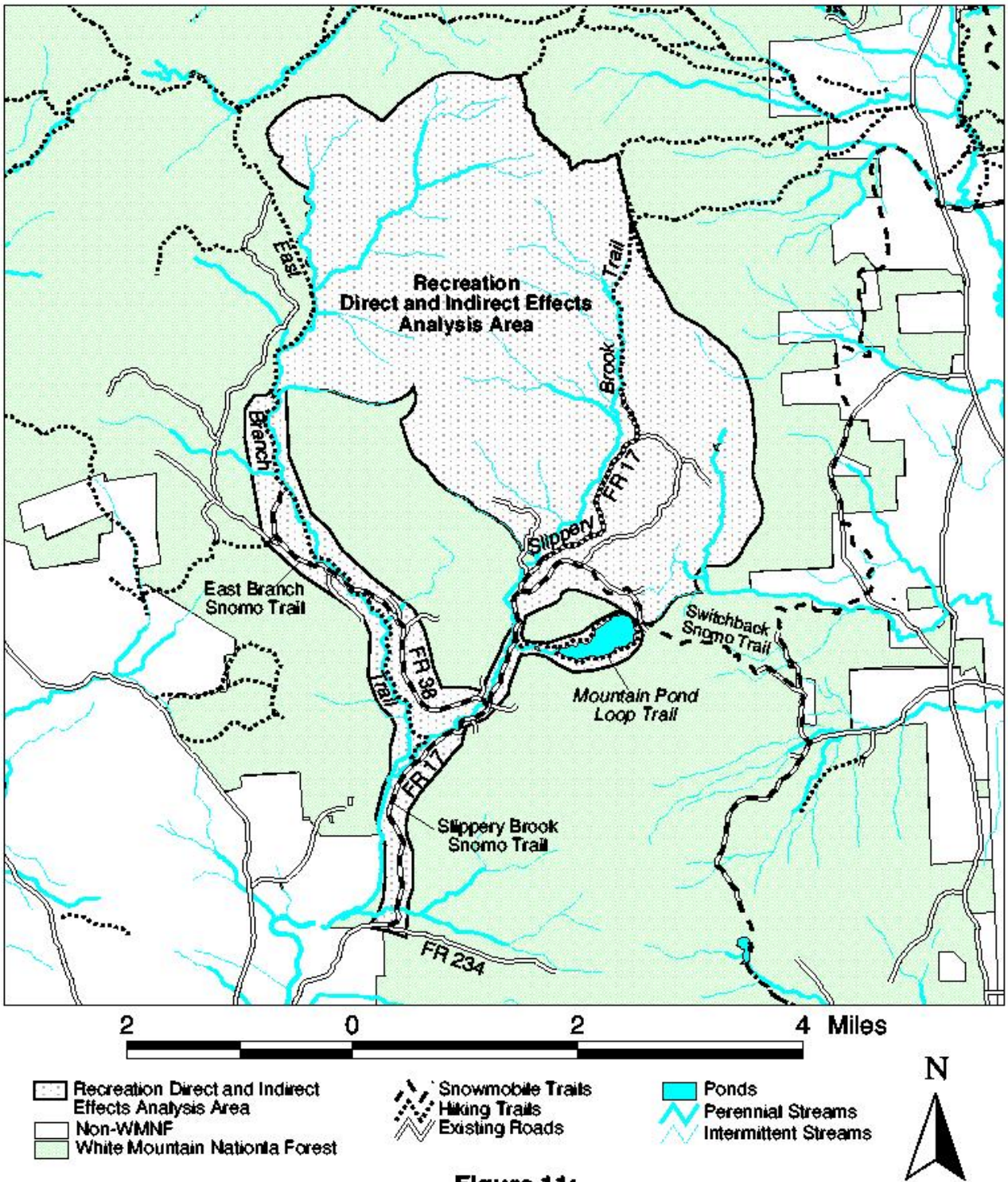

Figure 11:
Recreation
Direct and Indirect Effects
Analysis Area

Alternative 1: No Action Alternative
Alternative 1 would not alter current recreation opportunities.

Alternative 2: Proposed Action
This alternative would have the most short-term, direct and indirect effects on the recreation opportunities and experiences in the analysis area displayed in Figure 11. Effects of harvesting activity would impact hikers, snowmobilers, and other dispersed user such as mountain bikers, campers, hunters and anglers.

Hiking Trails
The Slippery Brook Trail lies in the center of the Chandler Round Project Area. Noise and vehicle traffic would increase along the southern portion of this low use trail when nearby units are harvested. For the 2.5 miles where Slippery Brook Trail and Road (FR17) share the same footprint, the trail and road would also be utilized as a haul route and would be restored to meet the road's current design standard. This effect would be mitigated long-term following logging activities by removal of culverts, creating waterbars, seeding and closing the road.

In this alternative, four harvest units (6, 8, 9 and 10) abut the Slippery Brook Trail. The harvest method for Units 6 and 8 would be group selection and for Unit 10 it would be a thin. Unit 9 is a clear cut located where the Slippery Brook Trail leaves the FR 17 corridor. Harvest activities would be visible along the shared trail and road corridor, as well as along the first ¼ mile after the trail leaves the road. Slash from cutting trees would be removed from a 50 foot buffer along the trail to mitigate adverse impacts. A 100 foot no-cut buffer would be used for Unit 9 (in Alternative 2) where it borders the Slippery Brook Trail. Signs to alert visitors of logging operations would be placed along the trail.

Two additional hiking trails, the East Branch and Mountain Pond Loop Trails, fall into the Recreation Analysis Area. Logging activities and increased truck traffic would add to the noise levels and traffic load of the area. Portions of the Mountain Pond Trail would be approximately ¼ mile from the nearest harvest units. The majority of the East Branch Trail is more than 1 mile from the closest harvest units.

Snowmobile Trails
Four designated snowmobile trails lie within the Recreation Analysis Area: Slippery Brook, Switchback, East Branch and Bradley Brook. The Bradley Brook Trail is not maintained for use and none of the proposed activities effect the trail corridor, so it will not be considered in this analysis.

Slippery Brook Road (FR17) would be utilized as the primary haul route for timber products. During winter sale operations, FR17 would be plowed to allow for hauling. The road width and adjacent topography would not safely accommodate dual use of FR17 from its intersection with Burnt Knoll Road (FR234) north. As a result, access to Slippery Brook and East Branch Snowmobile Trails would be closed. Access to Switchback Snowmobile Trail would still be possible via the North-South Trail, part of NH Corridor 19, three miles west of the Analysis Area. These trails receive moderate to high use during peak snow conditions and are also utilized by two permitted commercial outfitter/guides.

Switchback Trail is frequently used to access the North-South Trail corridor. Numerous other access points and parking areas for the North-South Trail exist on private land in the Conway area. Parking and access to North-South Trail is available on National Forest Lands at Basin Pond Road in Chatham.

Three harvest units (1, 2 and 24) are adjacent to the Switchback Snowmobile Trail. Units 1 and 24 are single tree selection harvest and unit 2 is a clearcut. The first half mile of the Switchback Trail shares the same footprint with FR17C which would be restored to the road's current design standard. When the

snowmobile trail reopens following logging activities, this effect would be mitigated by removal of culverts, replacing waterbars, seeding and closing the road.

Other Recreation Uses
Throughout the year, Slippery Brook Road is used for walking dogs, cross country skiing, dispersed roadside camping and mountain biking. Traffic control signs would be installed to alert foot and vehicle traffic to logging operations. The road and trails would remain open to foot travel even during winter. The majority of these uses occur south of the proposed harvest units. Traffic and consequently noise would increase on the road. Noise associated with harvest activity may be audible to visitors within one or two miles of logging operations.

The analysis area is also used by anglers and hunters. Similarly, short-term noise and traffic may temporarily, negatively impact their recreation experience. Since this alternative would establish the most early-successional forest stands and wildlife openings, future habitat and browse for certain game species would increase.

Alternative 3
This alternative would have fewer short-term direct and indirect effects on recreation than Alternative 2 or Alternative 4. In general, the frequency and intensity of adverse impacts would be lower with removal of only 2.5 million board feet of sawtimber and pulpwood compared to 6 million board feet in Alternative 2.

Hiking Trails
Under this alternative, the portion of the Slippery Brook Trail that lies on FR17 would neither be restored to road design standards nor would it be used as a haul route. Only two units (6 and 10) would occur along the trail corridor with single tree selection and thin harvest methods. Visual impacts along the trail would be less than in Alternative 2 and Alternative 4.

Noise levels from logging operations and traffic would increase over current levels, but would not approach the levels in Alternatives 2 and 4 due to fewer acres being treated. Signs to alert visitors of the logging operations would be placed along the trail.

Snowmobile Trails
In this alternative, effects to snowmobile trails will be similar to Alternative 2 in that the Slippery Brook Road would not be open in the winter to motorized uses during logging operations due to safety concerns. Slippery Brook and East Branch Snowmobile Trail would not be accessible. Switchback Snowmobile Trail could be accessed solely from the North-South Corridor. Identical harvest units and methods would be implemented along the Switchback Snowmobile Trail as in Alternative 2.

Despite the difference in acres treated, the duration of harvest activity for this alternative may be similar to that expected for Alternatives 2 and 4. In Alternatives 2 and 4, several sales operating simultaneously are anticipated, while this alternative will likely involve one sale. Therefore, the duration of impacts to snowmobile trails is not likely to vary significantly between any of the action alternatives.

Other Recreation Uses
The audible, visual and traffic impacts to other recreation uses such as mountain biking, camping and fishing would be less than either Alternative 2 or Alternative 4 due to fewer acres being treated. Traffic control signs would be installed to alert foot and vehicle traffic to logging operations. Significantly less early-successional forest stands and wildife openings would be created this alternative, limiting the

additional habitat and browse for certain game species such as moose.

Alternative 4

Alternative 4 would have effects very similar to Alternative 2. It differs in that:

- The frequency and intensity of effects on recreation use would be slightly less because fewer board feet of sawtimber and pulpwood would be harvested.
- Only three harvest units (6, 9, and 10) are immediately adjacent to Slippery Brook Trail.
- The harvest method for unit 9 would be a thin rather than a clearcut as proposed in Alternative 2, reducing visual impacts along the hiking trail.
- Approximately 79 fewer acres of early-successional forest stands and openings would be created, reducing the additional habitat and browse for some game species.

3.5.2 Cumulative Effects on Recreation

The Analysis Area for cumulative effects on recreation includes the Analysis Area for direct and indirect effects on recreation, and the following designated snowmobile trails: North Fork, Sawyer River Road, Rocky Branch and Bear Notch Snowmobile Trails (see Figure 12).

None of the action alternatives considered in detail in this document would change the long-term recreation opportunities described in the Forest Plan for the Analysis Area for cumulative effects on recreation. Recreation and vegetation management have co-existed in this area previously. The Slippery Brook Trail, East Branch Snowmobile Trail, Switchback Snowmobile Trail, and the Slippery Brook Snowmobile Trail all partially or completely share their corridors with roads originally constructed for hauling timber.

Short term effects from noise and traffic would not persist once the timber harvesting is completed. Restored roads would be seeded and closed and should appear similar to current conditions to forest users.

Several snowmobile trails, in addition to those identified in the direct and indirect effects, may be affected simultaneously. The Tremont, Iron Maple II and Bear Mountain Timber Sales may operate concurrently and effect snowmobile trails (see Table 15 below).

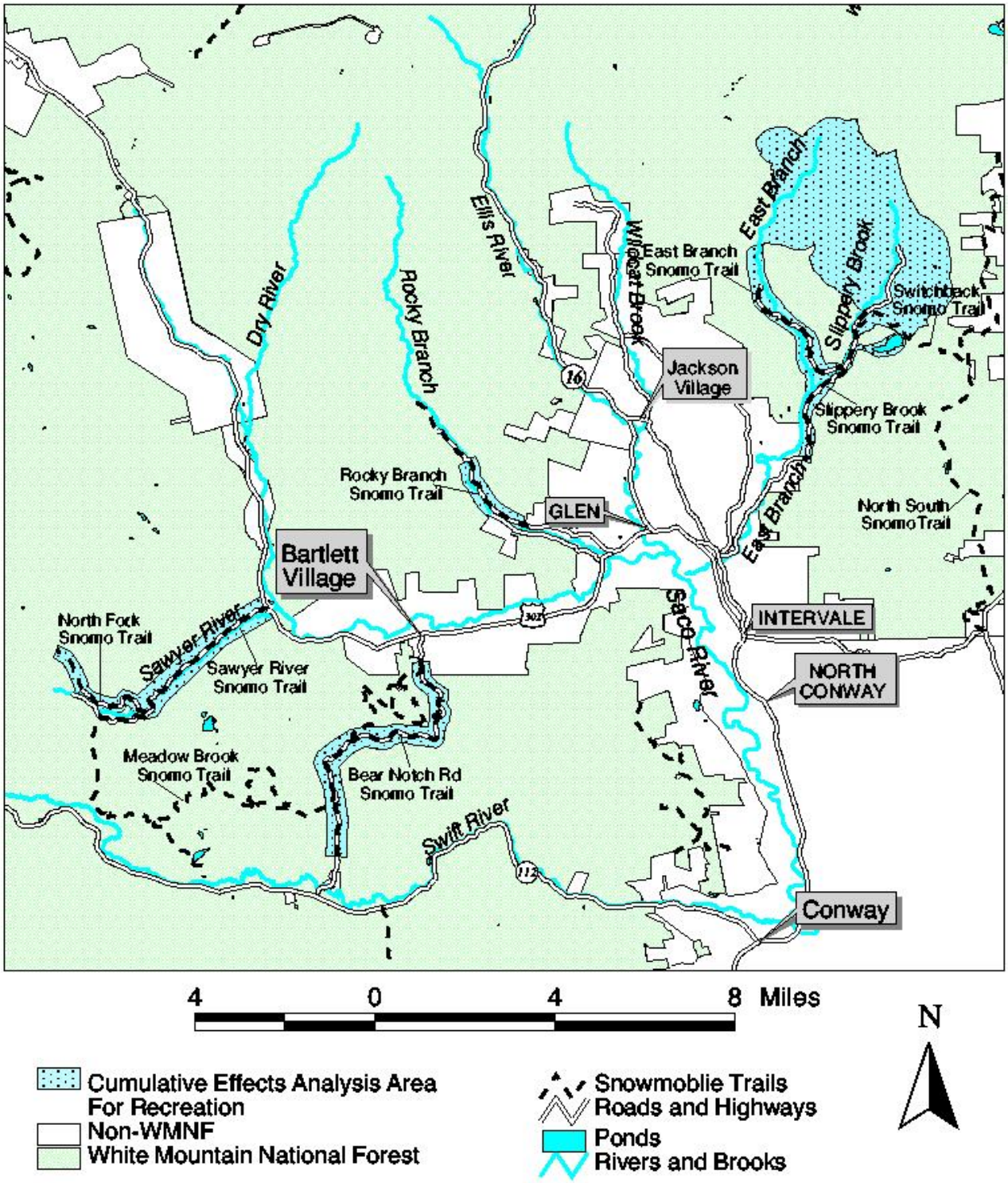

Figure 12:
Recreation Cumulative Effects Analysis Area

Table 15. Cumulative Effects on Snowmobile Trails

Project	Snowmobile Trail(s) Effected	Estimated Years of Operation	Mitigations and Other Access Points
Chandler- Round (Alternatives 2, 3, and 4)	Slippery Brook Road Switchback East Branch	2005-2007	Switchback accessible from North-South Trail; Parking at Basin Pond
Tremont Timber Sale	North Fork Sawyer River	2005-2006	Meadow Brook Trail remain open; access from Bear Notch system
Iron Maple II	Rocky Branch	2005-2006	Low use trail; not a loop system
Bear Mountain	Bear Notch Road	2005-2006	Bear Notch Road allows for dual use

Cumulatively, if Tremont, Iron Maple II and Chandler Round are all operational at the same time, snowmobile activities on National Forest Land in the Conway area would be impacted. The North-South Trail is not affected by any of the action alternatives in this document, but access through this project area is. The Slippery Brook and Switchback Snowmobile Trails are frequently used to access the North-South Trail, particularly during poor snow conditions. However, numerous alternate access points are available in the Conway area from private land and on National Forest Land at the Basin Pond Road in Chatham.

When safety concerns do not allow for dual use of snowmobiles, users would potentially be displaced and cause increased use of other trail systems such as the North-South and Bear Notch Snowmobile Trails. Bear Notch Road can safely accommodate dual use of logging trucks and snowmobiles and therefore, will remain open. When the Tremont Timber Sale impacts the Sawyer River Road and North Fork Snowmobile Trails, access to Meadow Brook will be possible via the Bear Notch Snowmobile Trail.

Cumulative effects on hiking trails and other recreation opportunities are not anticipated, even with multiple vegetation projects co-occurring, since trails remain open to foot travel during harvesting operations and roads remain open to motorized vehicle access during peak use months (spring, summer and fall). In addition, the use on Slippery brook trail is very low and any displacement that might occur would be unnoticeable on the numerous other trails in the area.

3.6 Socio-Economics

Affected Environment

The northern New Hampshire economy relies on tourism and to a large extent, the forest products industry. Forest products jobs are among the highest-paying jobs in the area. Two of the states largest mills are located in Gorham and Berlin. Other wood product mills in Jay and Rumford Maine, Henniker and Warren NH, in Newport Vermont, and in other locations within these three states utilize harvested trees for logs. Wood product manufacturers (furniture, pallets, and dozens of specialty products) are scattered throughout New Hampshire and Maine. These businesses purchase timber from a variety of sources including private timberlands, state and town forests, and the White Mountain National Forest. In addition, secondary wood products (milled wood) are supplied to manufacturing businesses and retailers throughout the east.

The New Hampshire Department of Resources and Economic Development reported that "forest products remain the states third largest industry, and are crucial to a balanced mix of manufacturing to maintain a stable economy, as well as maintenance of healthy forests for the future." However, from 1950 to 2000 the number of sawmills in New Hampshire dropped from 500 to a little more than 100. In the last three years, forest products production in the state has declined primarily due to competition from outside of New Hampshire, and from reductions in New Hampshire's wood supply.

From 1998 to 2001, the state's economy grew at more than 7 percent, yet wood products manufacturing jobs declined at 18 percent according to the U.S. Bureau of Labor Statistics. According to information presented during the Forest Industry Task Force meeting on September 26, 2003, in Concord, NH, trends in overall employment in wood manufacturing declined in 2001 - 2003. Statistics from 2002 show that 3,285 people work in wood product manufacturing in New Hampshire at 158 firms at an average salary of $30,000 a year, and at $37,000 a year for jobs at the roughly 38 paper companies.

The proposed sale units are located primarily within the Towns of Chatham (95%) and Jackson (5%), all within Carroll County. The main travel arteries providing access to the Project Area are State Routes 16 and 302, and Town Hall Road. Town Hall Road has been used for hauling timber many times in the past, and its continued use for this purpose would not represent a change in expectations for people who regularly travel or live on this road.

There are numerous costs with implementing a vegetative management project on the National Forest. One significant cost is for Analysis: planning the project and analyzing alternatives and potential environmental effects. This includes: 1) surveys (silvicultural, biological, soil, hydrological and cultural resource); 2) supporting analysis (roads, visuals and the analysis of the field survey and inventory data); 3) literature reviews; 4) public involvement; 5) interdisciplinary team planning meetings; 6) project layout; 7) development of silvicultural (harvest) prescriptions and; 8) preparation of the environmental assessment and decision documents.

Another significant cost is incurred for project implementation including timber sale preparation (boundary marking, marking trees for cutting, contract preparation and appraisal, and advertisement)

and timber sale administration (laying out skid trails, contract administration, site inspections, accounting, and supervising road work).

One purpose for harvesting timber in the Chandler Round Project Area is to provide high quality sawtimber. However, the National Forest Management Act provides direction that a harvest system should not be selected based exclusively on its dollar return or the greatest output of timber. Communities within which National Forest timber is harvested are reimbursed for the value of that timber through two separate funds.

- The State of New Hampshire has a tax on the value of timber harvested that is paid by the timber purchaser to the towns in which the timber is harvested. This tax averages about 10% of the value harvested, although it is actually based on the species cut. Chandler Round Project would provide timber tax directly to the Towns of Chatham and Jackson.

- The Twenty-Five Percent Fund Act of 1908, as amended, directed that 25% of all monies received from a National Forest during any fiscal year should be reimbursed to the state in which the National Forest is located, to be used "for the benefit of public schools and public roads of the county or counties in which such National Forest is situated." For Chandler Round Project, 25% of gross timber receipts would be returned to Carroll County.

Table 16 lists four of the most recent timber sales on the White Mountain National Forest. The average revenue generated by these sales is based on timber value minus road costs (which are built into the bid). From these figures, the average price of $181.42 per thousand board feet harvested is used to estimate the gross receipts for this projects' alternatives.

Table 16. Gross Revenue Generated from Timber Sales on the White Mountain National Forest for FY 2003

Timber Sale Name	FY Sold	Total Value	Total Volume (Mbf)	Price/Mbf
Stony Brook	2003	$271,687	1976	$137.50
Hix Mountain	2003	$345,657	1172	$294.93
Mack Brook	2003	$399,746	2575	$155.24
Clear Brook	2003	239,850	1738	$138.00
Average	In 2003			$181.42

The Analysis Area for direct and indirect effects to socio-economics is the Project Area (the units in which timber harvest is proposed). The Analysis Area for cumulative effects to socio-economics is the MA 2.1 and 3.1 National Forest and private lands in and adjacent to the project area (lands on which timber harvest is both a short-term and long-term option). Cumulative effects analysis will consider socio-economic activities past (1994-2004), present, and future (2004-2014).

3.6.1 Direct and Indirect Effects on Socio-Economics

Summary of Direct & Indirect Effects on Socio-Economics

Analysis Area	Time Period	Estimated Acres
Project Area (proposed cutting units)	Present	Alt 1 (0ac), Alt 2 (976ac), Alt 3 (380) & Alt 4 (927ac)

Alternative	Summary of Direct & Indirect Effects
1	No timber tax receipts or 25% fund revenue to local communities, Does not provide quality hardwood sawtimber to support community stability
2	Generates $1,088,520 in gross receipts, with estimated returns of $459,753 to the White Mountain National Forest and the U.S. Treasury, and $108,852 in timber tax receipts to the Towns of Chatham & Jackson, and 25% fund payments to Carroll County estimated at $272,130.
3	Generates $453,550 in gross receipts, with estimated returns of $246,154 to the White Mountain National Forest and the U.S. Treasury, and $45,355 in timber tax receipts to the Towns of Chatham & Jackson, and 25% fund payments to Carroll County estimated at $113,387.
4	Generates $554,932 in gross receipts, with estimated returns of $328,157 to the WMNF and the U.S. Treasury, and $90,710 in timber tax receipts to Chatham & Jackson, and 25% fund to Carroll County estimated at $226,775

Alternative 1: No Action Alternative

Since Alternative 1 harvests no timber, local governments in the Towns of Chatham and Jackson would not generate revenue from timber tax receipts, the 25% fund, or through indirect economic activity associated with logging. This alternative would not meet the Forest Plan Forest-wide goal of "assuring a stable, reliable source" of high quality hardwoods as a "raw material to support community stability" (Forest Plan, III-3). The cost of Analysis (project planning and environmental analysis) for this project would be $55,800, the average cost of Analysis for a project on the White Mountain National Forest (Table 17).

Table 17. Economic Characteristics by Alternative

Measure	Alt 1	Alt 2	Alt 3	Alt 4
Harvest Volume (Mbf)	0	6000 Mbf	2500 Mbf	5000 Mbf
Stumpage Receipts	$0	$1,088,520	$453,550	$907,100
Total Costs	$55,800	$356,637	$94,009	$352,168
• Analysis	$55,800	$55,800	$55,800	$55,800
• Sale Preparation	$0	$69,466	$27,319	$65,634
• Sale Administration	$0	$31,601	$12,660	$30,964
• Road & bridge cost	$0	199,770	$54,030	$199,770
Net Value of Receipts	($55,800)	$731,883	$359,541	$554,932
Unit Value $/Mbf	$0	$121.98	$143.82	$110.99
10% Yield Tax Receipts	$0	$108,852	$45,355	$90,710
25% Fund Payments	$0	$272,130	$113,387	$226,775
Receipts to the Federal Government	$0	$459,753	$246,154	$328,157

NOTES:

- Stumpage Receipts = Gross Receipts for volume estimated per alternative
- Unit Value = Net Value of Receipts / Harvest Volume by alternative
- 10% Yield Tax Receipts go to Towns of Chatham and Jackson
- 25% Fund Payments go to Carroll County for schools and roads

Action Alternatives 2-4

For each of the Alternatives, Table 17 provides a breakdown of estimated gross timber receipts based on proposed harvest volume and an average bid price of $181.42/mbf. Forest Service costs for preparing and administering each alternative are estimated based on volume for the alternative. Net Value of Receipts is the gross receipt minus the cost of analysis, sale preparation, sale administration and cost of road restoration maintenance and bridges. Unit Value/Mbf is the Net Value of Receipts per thousand board feet harvested in that alternative.

Each of the Action Alternatives would harvest timber, generating revenue for local governments in the Towns of Chatham and Jackson from timber tax receipts, the 25% fund, and through indirect economic activity associated with logging. The Action Alternatives would meet the Forest Plan Forest-wide goal of "assuring a stable, reliable source" of high quality hardwoods as a "raw material to support community stability" (Forest Plan, III-3). The cost of Analysis for this project is the same for all Alternatives and is estimated to be $55,800.

Alternative 2 harvests the most timber, and generates the most in stumpage and net receipts. It has the lowest unit costs, and the highest return to local communities through the timber tax and the 25% fund. Alternative 3 harvests the least timber, and generates the least in stumpage and net receipts. It has the highest unit costs, and the lowest return to local communities through the timber tax and the 25% fund.

3.6.2 Cumulative Effects on Socio-Economics

Summary of Cumulative Effects on Socio-Economics

Analysis Area	Time Period	Estimated Area
Towns within fifty miles of the Chandler Round Project	1994-2004 2004-2014	National Forest lands designated as MA 2.1 & 3.1 in the vicinity of HMU 505

Alternative	Summary of Cumulative Effects
1	No timber harvest or revenue generated, Does not preclude future timber harvest
2	Maximizes revenue now by proposing 976 acres of harvest, briefly restores the needed existing roads within the project area, including temporary bridges
3	Least revenue now, does not harvest 596 acres, and defers acquisition of portable bridge and restoration of FR 17A; it defers revenue on 596 acres to a future entry
4	Modest revenue now, slightly less than Alternative 2. Does not harvest on 49 acres and reduces clearcutting (even-aged harvest) on 79 acres, changing 65 of these acres to STS. It defers revenue on these 49 acres to future entry. Briefly restores needed existing roads within the project area, including temporary bridges

Revenue generated from current timber harvest on National Forest lands or from private lands in the cumulative effects analysis area for this project remain a factor (revenue/budgets) for some of the affected towns, and for Carroll County, and the state of New Hampshire. Sales since 2001 are generally not completed and still generate funds to some townships. These recent sales include Bear Mountain, Iron Maple II, Back-A-Pickering II, and Stony Brook are largely in Bartlett and Albany townships. Burnt Knoll Sale (Chatham township) has recently been completed. Tremont Timber Sale is in Livermore Township. The last sale of National Forest timber in the east branch drainage (Jackson township) was in the late 1980's, and has long since closed. Popple Mountain Vegetation Management Project planned for fiscal year 2005 is in Jackson Township. Chandler Round Project would provide a sustained revenue source to Chatham, Carroll County and the State of New Hampshire.

All of these existing sales, and proposed projects emphasize improvements in vegetative species and structural diversity, in the overall health of these ecosystems, and attempt to assure the quality of residual hardwood and softwood trees for potential future projects that would contribute stability to local economies and to the state of New Hampshire. The action alternatives support continued employment in harvesting, manufacturing, transportation, and associated forest products industries. Experience has indicated there is and would continue to be demand for timber products locally and nationally.

3.7 Wildlife

3.7.1 Background

The Wildlife Strategy for the White Mountain National forest states a diversity of habitats will be established to provide habitat for all native and desired non-native species. Since wildlife is directly related to the habitat it requires, wildlife management deals primarily with providing a diversity of habitat types to meet this objective.

The National Forest Management Act requires Forests to manage habitat to maintain viable populations of existing native and desired non-native vertebrate species (36 CFR 219.19). Forest wildlife species use a variety of habitat types and age classes to meet their needs. In forested habitat approximately 70% of the species use mature and overmature habitats while 66% use early successional habitats for all or part of their life cycle (DeGraaf and Yamasaki 2001, DeGraaf et al. 1992)

Over 416,000 acres (54 percent) of the 771,000-acre land base of the White Mountain National Forest are not actively managed. In these areas, natural disturbance and succession are the only means by which habitat changes. These reserve areas are highly interconnected throughout the Forest and provide large interior forest habitat for species dependent on this characteristic. Management Areas 2.1 and 3.1 are lands on which wildlife habitat (forested stands) can be managed, by providing a broad spectrum of habitat conditions. To meet the goals of the National Forest Management Act, the Forest developed a wildlife strategy based on Habitat Management Units (HMU) to provide necessary habitat diversity (Forest Plan, Appendix B, page VII-B 1-28).

An HMU is a unit of land large enough to provide habitat requirements of native wildlife species and may likely include upland vegetated areas, non-forested areas, wetlands, riparian zones, or areas of ecological significance.

Changes in community types within HMUs occur through natural succession over a long period of time, or through natural disturbances (wind, fire), or resulting management actions. Management actions allow Forests to achieve desired conditions within each HMU.

Management Area 2.1 and 3.1 lands are divided into uneven-aged and even-aged management systems. Within the even-aged portion the lands are further divided into age classes: regeneration, young, mature and overmature. The mature and overmature age classes (on average greater than 60 years and 120 years respectively) typically comprise between 75% and 100% of the even-aged lands. Regeneration-aged habitat (0-9 years) typically makes up less than 6% (USFS 1993-2000 Monitoring Reports).

Table 18 shows that harvesting since the 1986 Forest Plan included two sales, Sable Mountain and East Fork of the East Branch. Within HMU 505, these projects resulted in 206 acres of clearcuts, all of which have moved out of early successional stage except 58 acres. Seventy seven acres of thinning within HMU 505 were also accomplished. Older cuts from sales in the 1970 are evident in this HMU, and in adjacent HMU's. Most of these stands are approaching or have become hardwood pole stands with 2 to 4 inch diameter heavily stocked hardwood such as pin cherry, maples, birchs, aspen, and beech. Old skid roads and landings have revegetated with ground forbs, grasses, or hardwood and spruce brush, seedlings and saplings.

Table 18. Past Harvest History (since 1986) for HMU 505

Sale Name	Year Sold	Treatment	Acres
Sable Mountain	1986	Clearcut	98
		Commercial Thin	27
Total Acres			**125**
East Fork of the East Branch	1989	Clearcut	108
		Commercial Thin	50
Total Acres			**158**
Total of all sales			**283**

3.7.2 Affected Environment

HMU 505 contains a total of 8,375 acres and is the wildlife Analysis Area for direct, indirect, and cumulative effects. Of this acreage, 5,587 acres lie within Management Area 3.1 and are further defined as containing stand compartments 86, 87, 89, 90, 91, and 133. There are no MA 2.1 lands within the HMU. MA 6.1 and 6.2 lands encompass 2,788 acres or 33% of the analysis area and provide a large, contiguous area of uneven-age, interior forest habitat for species dependent on these characteristics. HMU Summary Tables show current habitat within HMU 505 and are located in the Chandler Round Project File at the District Office.

The primary community type is northern hardwood totaling 4085 acres. This HMU is one of the few on the Saco District that contain paper birch and aspen stands. Spruce/fir and hemlock are also present. An increase of softwood is desirable within HMU 505. No oak/pine communities are present, although scattered individual pine and oaks occur. Almost all of the paper birch and aspen stands are overmature. Ecological Land Types (ELTs) that support oak communities are present. Oak found in Unit 5 would be emphasized. Many stands have ELTs that promote sugar maple and ash. Promoting underrepresented community types and diversifying age classes within this HMU would respond to Forest Plan direction for wildlife habitat.

Beaver occupy small drainages in the area east of proposed units 4 and 23 and have increased the wetlands in this area. Another wetland known as Gracie's Meadow lies east of the project area. A boreal/transitional acidic fen lies between Slippery Brook and FR 17 at the base of Round Mountain.

There are 58 acres of regeneration-age (early successional habitat) in northern hardwoods within the analysis area. Forty of these are from clearcuts within HMU 505 that are heavily browsed by moose. The other 18 acres were harvested nine years ago.

Heavy to moderate ice storm damage occurred in the mature and overmature northern hardwood stands at mid-slope elevations throughout HMU 505 in 1998. The canopy damage opened the stand and resulted in a substantial increase in understory vegetation.

In the higher elevations within HMU 505 (MA 6.1 lands) northern hardwood, mixedwood, spruce/fir, overmature paper birch, and aspen stands total 2,788 acres. These community types will continue natural succession. Paper birch and aspen will decrease as spruce/fir and northern hardwoods become the climax forest type. There are no notable cliffs though North and South Bald Face have bare rocky summits that support some alpine plants.

The area between Round Mountain and Slope Mountain was a wintering area for white-tailed deer until the 1981 windstorm that blew down the softwood stand, and eliminated most of the softwood habitat. A winter track survey conducted in 2003 north of Mountain Pond showed no deer sign.

White-tailed deer, moose, black bear, fox, coyotes, fisher, otter, bob cats, snowshoe hare, red squirrels, numerous rodents, amphibians, reptiles and many species of resident and migratory birds have been observed in the analysis area.

The effects of the proposed action and all alternatives on wildlife habitat will be addressed via the HMU analysis under each alternative. The effects on wildlife species and population viability will be addressed via the Management Indicator Species. Impacts to the Canada lynx is addressed in detail in the Biological Evaluation.

3.7.3 Wildlife Effects

All alternatives, including No Action has an effect on wildlife species. The alternatives would benefit some species and adversely affect others. Management Indicator Species (MIS) are mentioned as examples of expected response to the alternative actions.

Active harvest operations and road restoration, bridge and culvert installation, increased short-term human access, and creating the proposed permanent wildlife openings could have direct and indirect effects to wildlife species from noise, human presence, and changes in habitat. Negative effects could include displacing wildlife including nesting birds or altering travel patterns of some species including amphibians and mammals. However, these effects rerely result in death of individuals. Beneficial effects of harvesting would include increased mobility on snow-packed trails for some species, and an additional source of browse from treetops on the ground.

This project is consistent with the Migratory Bird Treaty Act (Newton County Wildlife Association v. United States Forest Service).

Fragmentation as a result of even-age harvest methods occurs when large blocks of habitat are broken or separated by new openings, or early successional habitat. Species associated with the mature interior forests, such as wood thrush, could be negatively impacted. However, the White Mountain National Forest and most surrounding private lands are well forested. Research has found no evidence of negative effects of forest fragmentation exhibited in isolated forest environments in these large forested areas, even with active timber harvesting (Askins et al. 1990, Askins 1993, DeGraaf and Healy 1988, Thompson et al. 1992). Less than half of the WMNF is open to timber harvesting, and within available areas, a maximum of 10% could be clearcut with a 10 year period.

Under current wildlife strategy for the WMNF suitable habitat for forest interior wildlife species, such as wood thrush, is expected to be maintained. In addition, brown-headed cowbird, a species associated with deforestation and forest fragmentation, has not been observed in the interior of the WMNF, indicating fragmentation does not exist (Yamasaki et.al. 2000). More information on general effect of

vegetative management on wildlife is outlined in the WMNF FEIS in Chapter IV, sections 9 and 11.

3.7.3.1 Alternative 1: No Action

There would be no direct effects from tree removal, compaction of snow or soil, noise, or other habitat management. No road or landing restoration or replacement of bridges would occur. No disturbance or displacement of wildlife would occur. Natural succession of mature stands would result in uneven-aged forest

The distribution of various communities and age classes over a landscape (horizontal diversity) would decline with this alternative (Forest Plan VII-B-5-13). Northern hardwoods would continue to dominate the project area with 1,100 acres of mature northern hardwood becoming overmature within twenty years. During the same period 75 acres of young softwood would move to the mature age class and 71 acres would move from mature to overmature. This results in little age-class diversity throughout the analysis area (Table 19).

Table 19. Age Distribution as Seen in the year 2024 for HMU 505

Community	Regeneration Age	Young Age Class	Mature Age Class	Overmature Age Class
Northern Hardwoods	0 Acres	741 Acres	1250 Acres	1643 Acres
Paper Birch	0	159	0	667
Aspen	0	0	0	0
Spruce/Fir	0 Acres	0 Acres	86 Acres	112 Acres

The aspen community type and several stands of paper birch are expected to succeed into a softwood community type. Overall diversity within HMU 505 would decline. Wildlife species desiring early successional community types would not find suitable habitat in this area. This in turn delays attainment of successional age classes (such as young-aged stands) over the long term. Individuals of a species may still be found in the area but would most likely be passing through. No Action provides habitat for species requiring mature and overmature interior, forested northern hardwood habitat. However, no species is expected to be extirpated or have its viability jeopardized under this alternative.

This alternative does not meet the objectives of the Forest Plan for MA 3.1, which is to provide habitat especially for those species requiring early successional habitat.

The cumulative affects Analysis Area for wildlife habitat is HMU 505. The temporal scope for wildlife habitat is twenty years in the past and twenty years in the future, the expected time between harvest entries into this HMU. Since 1986 there have been two timber harvest projects in HMU 505 (map in project file): Sable Mountain sale and East Fork of the East Branch sale. These sales along with salvage of blow down near Gracie's meadow in the early 1980's created the current regeneration-age and young age stands in the HMU. Fifty-eight acres remain in early successional habitat.

Age class diversity for the Forest has fallen below the desired levels for regeneration age stands, and exceeds goals for overmature age classes for all habitat types within MA 2.1 and 3.1 (USFS 1996). The

annual amount of clearcutting (the primary management tool used to create northern hardwoods regeneration) has declined from 3308 acres in 1970 to 242 acres in 2000 (USFS 1998). For habitat diversity, the forest continues to have far more acres of northern hardwood community type than desired and less of all other community types, such as spruce/fir and hemlock (USFS 1996).

3.7.3.2 Alternative 2

Under group selection harvest red spruce, balsam fir and hemlock would increase in mixedwood stands and the stands would eventually provide softwood habitat. This ultimately converts 274 acres from northern hardwood (includes mixedwood) to softwood habitat (Table 20).

Group selection harvest would remove groups of trees but overall retain a canopied, interior forest condition. Return entries every 20 years on average to treat other portions of each stand results in more frequent beneficial and adverse disturbance to wildlife. Benefits include tops left, which provide immediate forage (browse) and stump sprouting.

Alternative 2 moves toward desired conditions by increasing the amount of softwood habitat and young stands, and reduces over-mature northern hardwood habitat.

Table 20. Summary of Alternative 2 for HMU 505

Com-munity *	Regen Acres			Young Acres			Mature Acres			Overmature Ac			Uneven Age		
	E	D	Alt 2	E	D	Alt 2	E	D	Alt 2	E	D	Alt 2	E	D	Alt 2
NH	**25**	**162**	150	**716**	**568**	713	**2352**	**730**	1756	**541**	**162**	390	**451**	**1200**	713
PB	**33**	**83**	106	**126**	**371**	126	**0**	**289**	0	**667**	**83**	667	**0**	**0**	0
Aspen	**0**	**40**	0	**0**	**119**	0	**0**	**80**	0	**179**	**26**	179	**86**	**0**	86
S/F	**0**	**37**	0	**75**	**92**	75	**82**	**200**	82	**41**	**37**	41	**168**	**957**	448
PWO	**2**	**20**	12												

***NH = Northern Hardwood *S/F = Spruce/Fir *PB= Paper Birch**
PWO= Permanent Wildlife Opening E = Existing D = Desired

A total of 256 acres of regeneration-age habitat and ten acres of permanent wildlife openings are created. Unit 9, 22, and 25 are on soil types (ELTs) that indicate paper birch and aspen would readily regenerate these stands, increasing young paper birch stands to 106 acres. This alternative meets 86 percent of HMU 505s desired paper birch and aspen regeneration needs. Clear-cutting is the best method to regenerate and establish paper birch and aspen (Perala, D. and J. Russell. 1983; L. Safford and R. Jacobs. 1983; DeGraaf, et al. 1989). Without a disturbance such as a blowdown or clear-cutting, these species would continue to decline in the area.

Clearcut units 2, 9, 22, 25, and 30 lie adjacent to units that would be managed for softwood habitat. This is desirable for species such as snowshoe hare and deer that require softwood winter cover and a nearby source of available forage. The Lynx Conservation Strategy also suggests increasing forage near softwood cover for snowshoe hare.

Northern Hardwood Mature Habitat

This Alternative thins northern hardwood Units 10, 12, 15, 16, and 21. These stands have moderate damage as a result of the 1998 ice storm. Thinning these 195 acres would open the understory and reduce the canopy cover, however, interior forest would remain and edge habitat is not created. Mast trees (beech) would develop larger crowns and potentially provide more mast. Residual stumps may sprout providing additional browse.

Units 4, 5, 11, 13, 20, 23, 24, 29, and 31 contain high quality sugar maple and ash which received moderate ice damage and would receive group selection harvests with single tree selection to promote uneven-age forest with high quality hardwood sawtimber.

Clearcuts reduce mature and overmature forest by 200 acres, and convert them to early successional habitat. Two 1-acre former log landings are counted as permanent wildlife (grassy or shrubby) openings. This alternative would increase these wildlife openings to ten acres.

Wildlife openings would be maintained every three to five years through mowing or prescribed burning. Mowing may occur between June and December. Short-term wildlife displacement is typical, however crushing and nest destruction may also occur. Burning would occur only as approved in a prescribed burn plan, typically during late April and May. In general, while some evidence of vertebrate mortality has been reported, common opinion is that vertebrates are rarely killed in fires. (Lyon et al. 1978).

Cumulative Effects on Wildlife Habitat

Alternative 2 best achieves the desired future habitat condition for this HMU. It would benefit wildlife species requiring mature northern hardwoods, softwood cover, interior forest conditions, regeneration-age habitat and permanent upland openings. Northern hardwood regeneration is increased by 125 acres or 93% of the desired amount. Paper birch community type is perpetuated. This is important because the MIS for paper birch are similar to those for aspen, and aspen is expected to decline in this HMU over the next several years. While no aspen stands are expected under this alternative, the aspen component is expected to increase in clearcuts, group selections and along roads. This alternative meets 86% of the paper birch/aspen regeneration-age community type. Softwood habitat is increased and mixedwood stands would increase in softwood component. Permanent upland openings are increased to 60% of the desired amount. The reduction in mature and overmature northern hardwoods and an increase in northern hardwood uneven-age acres is desired.

3.7.3.3 Alternative 3

This alternative defers harvest in Units 8, 9, 11-22, and 25-30. Effects in these units would be similar to that described under the No Action Alternative (Alternative 1).

Under this alternative 96 acres (Units 1, 3 and 6) of mixedwood habitat would be converted to softwood. This moves more acres towards the desired condition than the No Action Alternative, but fewer than Alternative 2. Clearcut Units 2 and 7 would result in 75 acres of northern hardwood regeneration-age habitat. No regeneration age paper birch stands would occur on these units.

Table 21. Summary of Alternative 3 for HMU 505

Com-munity *	Regen Acres			Young Acres			Mature Acres			Overmature Ac			Uneven Age		
	E	D	Alt 3	E	D	Alt 3	E	D	Alt 3	E	D	Alt 3	E	D	Alt 3
NH	**25**	**162**	75	**713**	**568**	713	**2352**	**730**	2169	**541**	**162**	390	**451**	**1200**	632
PB	**33**	**83**	0	**126**	**371**	0	**0**	**289**	0	**667**	**83**	667	**0**	**0**	0
Aspen	**0**	**40**	0	**0**	**119**	0	**0**	**80**	0	**179**	**26**	179	**86**	**0**	86
S/F	**0**	**37**	0	**75**	**92**	75	**82**	**200**	82	**41**	**37**	41	**168**	**957**	264
PWO	**2**	**20**	12												

***NH = Northern Hardwood *S/F = Spruce/Fir *PB= Paper Birch**
PWO= Permanent Wildlife Opening E = Existing D = Desired

Under Alternative 3, Units 4, 5, 10, 23, 24 and 31 (232 acres) would receive group selection or thinnings to promote quality hardwood sawtimber, stand vigor and uneven aged stand conditions. Small gaps in the forest canopy, or larger (one to two acre) openings retain overall forested habitat. Mast trees such as beech would be able to develop larger crowns thereby potentially providing more mast. Residual stumps would sprout providing additional browse.

Treated areas would have similar direct, indirect and cumulative effects as described for Alternative 2

Cumulative Effects of Alternative 3

This alternative proposes the least amount of diversity of the action alternatives. No activity would occur on the west side of Slippery Brook with similar effects as described under Alternative 1. Softwood habitat is increased on 96 acres. Regeneration-age habitat is created on 50 acres, but no acres of aspen or paper birch community types are created. Mature northern hardwoods are over-represented with 2,169 acres when 730 acres are desired. Treated areas would have similar cumulative effects as described for Alternative 2.

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3.7.3.4 Alternative 4

This alternative defers harvest in Units 8, 18, and 21, converts portions of clearcut units 25 and 30 into Units 17 and 20, and omits more than half of clearcut unit 26.

Table 22. Summary of Alternative 4 for HMU 505

Com-munity *	Regen Acres			Young Acres			Mature Acres			Overmature Ac			Uneven Age		
	E	D	Alt 4	E	D	Alt 4	E	D	Alt 4	E	D	Alt 4	E	D	Alt 4
NH	**25**	**162**	102	**716**	**568**	713	**2352**	**730**	1797	**541**	**162**	390	**451**	**1200**	768
PB	**33**	**83**	33	**126**	**371**	0	**0**	**289**	0	**667**	**83**	667	**0**	**0**	0
Aspen	**0**	**40**	0	**0**	**119**	0	**0**	**80**	0	**179**	**26**	179	**86**	**0**	86
S/F	**0**	**37**	0	**75**	**92**	75	**82**	**200**	82	**41**	**37**	41	**168**	**957**	431
PWO	**2**	**20**	12												

***NH = Northern Hardwood *S/F = Spruce/Fir *PB= Paper Birch**
PWO= Permanent Wildlife Opening E = Existing D = Desired

Under this Alternative, 263 acres of mixedwood habitat would be converted to softwoods in Units 1, 3, 6, 14, 17, and 19. Clearcut would result in 77 additional acres of northern hardwood regeneration-age habitat for a total of 102 acres, and 42 additional acres of paper birch regeneration-age habitat for a total of 75 acres. Effects would be similar to those described under Alternative 2. This approaches Alternative 2 in moving toward the desired condition for the HMU.

Northern hardwood units 4, 5, 11, 13, 20, 23, 24, 28, 29, and 31 (333 acres) would receive group selection harvest and Units 9, 10, 12, 15, and 16, (210 acres) would receive commercial thinnings to promote quality hardwood sawtimber. Group selection creates small gaps in the forest canopy yet retains forested habitat. Mast trees such as beech would develop larger crowns thereby potentially providing more mast. Residual stumps would sprout providing additional browse. Permanent wildlife openings would be similar to that under Alternative 2, with similar effects.

Cumulative Effect of Alternative 4
This alternative moves towards the desired future condition for HMU 505 to a lesser extent than Alternative 2, and more than Alternatives 1 and 3. Alternative 4 would benefit wildlife species requiring mature northern hardwoods, softwood cover, interior forest conditions, regeneration-age habitat and permanent upland openings. This alternative meets 90% of the paper birch regeneration-age community type by adding 42 acres to the existing 33 acres. If aspen and paper birch were combined this alternative would result in attaining 61% of the regeneration-age class for these types. The total acres of softwood habitat are increased. Permanent upland openings are increased by 10 acres resulting in 60% of the desired amount. Northern hardwoods regeneration acres and northern hardwood uneven-age acres are increased as desired.

3.8 Management Indicator Species

Regulations developed in 1982 to implement the National Forest Management Act directed National Forests to maintain viable populations of existing native and non-native vertebrate species (36 CFR 219.19) by maintaining and providing suitable habitat that is well distributed (CFR 219.19). **Management Indicator Species (MIS)** associated with various habitats were selected to assess the effects of National Forest management activities (as directed in 36 CFR 219.19 and documented in Appendix B of the Forest Plan, pages 1-28). MIS may be affected by a project, however viable populations encompass a much larger land base than the project area. MIS are monitored forest-wide because they represent affects of the Forest Plan.

The analysis area for direct and indirect effects on MIS is the Project Area. The Project Area is the units proposed for vegetative management and the associated roads and landings. Representative indicator community types exist or potentially exist in the Project Area for twelve MIS. They are chestnut-sided warbler, Northern goshawk, broad-winged hawk, ruffed grouse, snowshoe hare, Cape May warbler, mourning warbler, eastern bluebird, eastern kingbird, brook trout, American marten, and Canada lynx.

The Analysis Area considered for cumulative effects on MIS population trends is described in the MIS and population viability report, White Mountain National Forest (USFS 2001a). The temporal scope for MIS is ten years past and ten years into the future.

Brook trout is discussed in the fisheries report. Canada lynx is discussed in the federal/RFSS Biological Evaluation. Suitable habitat (wetlands) for black duck exists within the analysis area but lies outside of the affected areas. The project is not expected to effect rufouse-sided towhee, gray squirrel and black duck, therefore these MIS species are not addressed further.

Table 23 identifies MIS on the forest and whether the indicator habitat occurs or has potential to occur in the Project Area. Individual species discussions that expand on Table 23 are found in the project files, and are available upon request from the Saco Ranger District.

Affected Environment

Northern goshawks have a relatively stable population on the WMNF though they are uncommon (USFS 2001b). Regional data indicate that nesting habitat for this species is expanding in the eastern United States as forests mature.

Cape May warbler populations have fluctuated between 1966 and 1979 but are now stable (USFS 2001b). This species has been detected sporadically during eight years of monitoring on the White Mountain National Forest (MacFaden and Capen 2000).

American marten are slowly increasing, particularly in the northern section (USFS 2001b) following their reintroduced to the WMNF in the mid-1970s (USFS 2001b). Softwood habitat at all elevations are preferred by martin.

Broad-winged hawk and ruffed grouse require young aspen and paper birch stands. The relative abundance of mature and overmature, and lack of young aspen and paper birch stands on the Forest has resulted in a decline in habitat (WMNF Habitat Trend Analysis 1984 – 2003). Broad-winged hawk populations have been stable on the WMNF and in the region. Ruffed grouse population trends have fluctuated on the WMNF making a trend unclear (USFS 2001b).

Chestnut-sided warblers and mourning warblers are declining in the region due to reduction in early successional habitat and in part due to forest succession (MacFaden and Capen 2000). The downward trend of wildlife species associated with early successional habitat is well recognized across New England (Askins et al. 1990, Askins 1993, Smith et al. 1992, Hagan 1993, Litvaitis 1993, Litvaitis et al. 1999, Rosenberg and Hodgman 2000, Thompson et al. 2001). Regrowth of forest on abandoned farms, and from large scale harvesting in the late 1800s and early 1900s, the intensification of agriculture on remaining farmlands, and increased human development are all factors attributed to the decline of this group of species.

Spruce/fir habitat has declined on the WMNF below 2,500' (WMNF 2003 Habitat trend analysis 1994 – 2003) however, higher elevation portions of the WMNF provide extensive softwood habitat for species such as snowshoe hare (USFS 2000a). Snowshoe hare are subject to cyclic fluctuations. Forestwide populations were considered stable in the early 1990s and appear to be increasing (USFS 2001b).

Regional trends for northern New England and the Maritimes indicate mourning warbler populations are stable (USFS 2000a). Recent transects across the WMNF in managed and non-managed lands showed a consistent significant decline for mourning warbler during eight years of monitoring. This was at least partly attributed to forest succession within the study area (MacFaden and Capen 2000).

3.8.1 Direct, Indirect and Cumulative Effects on Management Indicator Species

Effects of Alternative 1

This alternative maintains habitat throughout the project area for northern goshawk, Cape May warblers, and American marten, the MIS for mature and overmature northern hardwoods and mixedwoods, spruce/fir and forests where basal area exceeds 80ft².

No new permanent wildlife openings or early successional habitat would be created for species such as chestnut-sided warbler, ruffed grouse, and snowshoe hare (MIS for regeneration northern hardwoods, aspen, paper birch, and spruce/fir). Successionally young aspen and paper birch stands, which ruffed grouse and broad-winged hawk prefer, would not be started (clearcuts). Habitat for species dependant or preferring early successional habitat such as chestnut-sided warblers would not be created. There would be no addition in shrubby/grassy opening habitat for mourning warblers.

MIS associated with mature northern hardwood, mixedwood, spruce/fir, and hemlock habitats (northern goshawk, Cape May warbler, white-tailed deer, American marten) would benefit. The populations for these species is increasing on the WMNF.

No MIS species would have their viability jeopardized under the No Action Alternative. For all other MIS, No Action would cause no change in habitat and no change in population trend**.**

Table 23 MANAGEMENT INDICATOR SPECIES in the CHANDLER ROUND PROJECT									
Management Indicator Species	**Habitat the Species is Representing as a Management Indicator**	**Habitat Present in Analysis Area/Potential in Analysis Area**	**Documented or Suspected in Analysis Area**	**Regional Population Trend***	**Habitat Trend#**	**Expected Changes from Project Implementation**			
						Alt 1	**Alt 2**	**Alt 3**	**Alt 4**
Chestnut-sided warbler *Dendroica pensylvanica*	Regeneration (0-9yrs old) Northern Hardwood/Mixedwd	Yes	Suspect	Declining	Declining	Existing habitat would move into young age class.	Creates 198 acres of suitable habitat.	Creates 52 acres of suitable habitat.	Creates 119 acres of suitable habitat.
Northern Goshawk *Accipiter gentilis*	Mature and Overmature (60+yrs old) Northern Hardwood/ Mixedwood	Yes	Suspect, but broadcast call surveys did not yield presence	Uncommon but Stable	Mature and overmature hardwood age class increasing in acres	No Change	Eliminates nesting habitat on 198 acres.	Eliminates nesting habitat on 52 acres.	Eliminates nesting habitat on 119 acres.
Broad-winged Hawk *Buteo platyperus*	Mature and Overmature Paper Birch and Aspen (Aspen=40+ yrs; Birch= 50+yrs)	Yes	Suspect	Stable	Mature age class decreasing; overmature age class somewhat stable	Decrease of 179 acres of OM aspen due to die out.	Creation of 73 acres of paper birch habitat for future suitable habitat; but lose 179 acres of OM aspen due to die out.	Decrease of 179 acres of OM aspen due to die out.	Creation of 42 acres of paper birch habitat for future suitable habitat, but lose 179 acres of OM aspen due to die out.

Table 23 MANAGEMENT INDICATOR SPECIES in the CHANDLER ROUND PROJECT									
Management Indicator Species	**Habitat the Species is Representing as a Management Indicator**	**Habitat Present in Analysis Area/Potential in Analysis Area**	**Documented or Suspected in Analysis Area**	**Regional Population Trend***	**Habitat Trend#**	**Expected Changes from Project Implementation**			
						Alt 1	**Alt 2**	**Alt 3**	**Alt 4**
Ruffed Grouse *Bonasa umbellus*	All Ages of Aspen and Regeneration and Young Paper Birch (0-49 yrs)	Yes	Suspect	Declining or uncertain	Paper birch & aspen regen decreasing Young age classes increasing	Decrease of 179 acres of OM aspen due to die out.	Creation of 73 acres of paper birch habitat for future suitable habitat; but lose 179 acres of OM aspen due to die out.	Decrease of 179 acres of OM aspen due to die out.	Creation of 42 acres of paper birch regen for current & future suitable habitat, but lose 179 acres of OM aspen due to die out.
Rufous-sided Towhee *Pipilo erythrophthalmus*	Regeneration of Young Oak or Oak/Pine (0-59yrs)	No/Yes	No	Declining	Decreasing	No habitat present at this time	No habitat created in this proposal; no suitable soils in project area.	No habitat created in this proposal; no suitable soils in project area.	No habitat created in this proposal; no suitable soils in project area.
Gray Squirrel *Sciurus carolinensis*	Mature and Overmature Oak or Oak/Pine (60+ yrs)	No/Yes	No	Stable	Stable	No habitat present at this time	No habitat created in this proposal; no suitable soils in project area.	No habitat created in this proposal; no suitable soils in project area.	No habitat created in this proposal; no suitable soils in project area.
Northern Junco *Junco hyemalis*	Regeneration and Young Pine (0-69 yrs)	No/Yes	Suspect (does utilize other habitats).	Slight decline	Decreasing	No change	No change	No change	No change

Table 23 MANAGEMENT INDICATOR SPECIES in the CHANDLER ROUND PROJECT									
Management Indicator Species	**Habitat the Species is Representing as a Management Indicator**	**Habitat Present in Analysis Area/Potential in Analysis Area**	**Documented or Suspected in Analysis Area**	**Regional Population Trend***	**Habitat Trend#**	**Expected Changes from Project Implementation**			
						Alt 1	**Alt 2**	**Alt 3**	**Alt 4**
Pine Warbler *Dendroica pinus*	Mature and Overmature Pine (70+ yrs)	No/Yes	No	Increasing	Stable	No change	No change	No change	No change
White–tailed Deer *Odocoileus virginianus*	All Ages Hemlock during deep-snow winters.	No/Yes	Suspect (does utilize other habitats).	Stable	Stable to decreasing	No change	No change	No change	No change
Snowshoe Hare *Lepus americanus*	Regeneration of Young Spruce, Spruce/Fir and Fir (0-39 yrs)	No/Yes	Suspect: have seen evidence of presence in analysis area.	Stable to increasing	Decreasing	No change	Initiate conversion to S/F on 200 acres.	Initiate conversion to S/F on 56 acres.	Initiate conversion to S/F on 195 acres.
Cape May Warbler *Dendroica tigrina*	Mature and Overmature Spruce, Spruce/Fir and Fir (40+yrs)	Yes	No	Stable/fluctuate with spruce budworm outbreaks	Increasing	No change	Initiate conversion to S/F on 200 acres.	Initiate conversion to S/F on 56 acres.	Initiate conversion to S/F on 195 acres.

Table 23 MANAGEMENT INDICATOR SPECIES in the CHANDLER ROUND PROJECT									
Management Indicator Species	**Habitat the Species is Representing as a Management Indicator**	**Habitat Present in Analysis Area/Potential in Analysis Area**	**Documented or Suspected in Analysis Area**	**Regional Population Trend***	**Habitat Trend#**	**Expected Changes from Project Implementation**			
						Alt 1	**Alt 2**	**Alt 3**	**Alt 4**
Eastern Kingbird *Tyrannus tyrannus* **Eastern Bluebird** *Sialia sialis*	Upland Openings – Grass, Forb, Orchard	No/Yes	No	Declining Increasing	Stable to decreasing	No change	No change	No change	No change
Mourning Warbler *Oporornis philadelphia*	Upland Openings-Shrub; Forest Ecotone	Yes	Suspect	Stable	Decreasing	No change	Increase upland openings by 10 acres	Increase upland openings by 10 acres	Increase upland openings by 10 acres
Black Duck *Anas rubripes*	Wetlands and Water	Yes	Suspect	Declining	Fluctuates with beaver activity	No change	No change	No change	No change
Brook Trout *Salvelinus fontinalis*	Permanent Lakes, Ponds, Streams	Yes	Yes	Stable	Stable	No change	No change	No change	No change
Peregrine Falcon *Falco peregrinus*	Cliffs and Talus	No/No	No	Increasing	Stable	N/A	N/A	N/A	N/A

Table 23 MANAGEMENT INDICATOR SPECIES in the CHANDLER ROUND PROJECT									
Management Indicator Species	**Habitat the Species is Representing as a Management Indicator**	**Habitat Present in Analysis Area/Potential in Analysis Area**	**Documented or Suspected in Analysis Area**	**Regional Population Trend***	**Habitat Trend#**	**Expected Changes from Project Implementation**			
						Alt 1	**Alt 2**	**Alt 3**	**Alt 4**
American Marten *Martes americana*	At least 80% of their home range must have forest that is 30+' tall with at least 80 ft² of basal area	Yes	Suspect	Increasing	Increasing	No change	Potential to reduce habitat suitability by approximately 14%	Potential to reduce habitat suitability by approximately 6%	Potential to reduce habitat suitability by approximately 13%
Osprey *Pandion haliaetus*	Large water bodies	No/No	No	Increasing	Stable	N/A	N/A	N/A	N/A
Common Loon *Gavia immer*	Large water bodies	No/No	No	Increasing	Stable	N/A	N/A	N/A	N/A
Sunapee Trout *Salvelinus aureolus*	Deep cold water bodies with shallow gravel bars	No/No	No	Considered extirpated from WMNF	Stable	N/A	N/A	N/A	N/A
Robbin's Cinquefoil *Potentilla robbinsiana*	Alpine	No/No	No	Stable/Increasing; Delisted in 2002	Stable	N/A	N/A	N/A	N/A

Table 23 MANAGEMENT INDICATOR SPECIES

in the
CHANDLER ROUND PROJECT

Management Indicator Species	Habitat the Species is Representing as a Management Indicator	Habitat Present in Analysis Area/Potential in Analysis Area	Documented or Suspected in Analysis Area	Regional Population Trend*	Habitat Trend#	Expected Changes from Project Implementation			
						Alt 1	Alt 2	Alt 3	Alt 4
Canada Lynx *Lynx canadensis*	Dense softwoods	Yes, suitable habitat in Units 1, 6, 8, 10, 14, 16, 17, 18, 22, 25, 31 and parts of 2, 3, 4, 9, 15, 23, 24, and 30.	No	Considered Extirpated from WMNF	Increasing	No change	Initiate conversion to S/F on 200 acres.	Initiate conversion to S/F on 56 acres.	Initiate conversion to S/F on 195 acres.
Gray-cheeked Thrush (now **Bicknell's Thrush)** *Catharus bicknelli* **Blackpoll Warbler** *Dendroica striata*	High elevation spruce/fir	No/No	No	Declining Stable?/fluctuate with spruce budworm outbreaks	Stable	N/A	N/A	N/A	N/A

NA Not Applicable as the habitat is not present nor expected in the analysis area.

*USDA FS. 2001. Evaluation of Wildlife Monitoring and Population Viability WMNF Management Indicator Species. WMNf, Laconia, NH.

#USDA Forest Service. 1991. 1993. 1994. 1995. 1996. 2000. Monitoring Reports, White Mountain National Forest, Laconia, NH

USDA Forest Service. 2001. Analysis of the Management Situation for Wildlife, White Mountain National Forest, Laconia, NH

USDA Forest Service. 2003. CDS database

Trani et. al. 2001. Patterns and trends of early successional forests in the eastern United States *in* Conservation of Woody, Early Successional Habitats and Wildlife in the Eastern United States. Wildlife Society Bulletin 2001 29(2): 407-494.

Typical open stand conditions and advanced regeneration

Forest Road 17, Slippery Brook road, in the section that serves as a trail.

Effects of Alternative 2 on MIS

The creation of 200 acres of northern hardwood and paper birch regeneration would increase earky successional habitat for chestnut-sided warbler and ruffed grouse.

The reduction in overmature paper birch and aspen habitat through succession is somewhat mitigated by the increase of regeneration-age paper birch habitat that would ultimately grow into nesting habitat for broad-winged hawk.

MIS requiring mature forested habitat for all or part of their life cycle such as northern goshawk, Cape May warbler, and American Marten would be maintained. Group selection openings in softwoods and mixedwood habitat may benefit snowshoe hare and other species that use small early successional openings.

Expansion of permanent wildlife openings would benefit species associated with upland shrubby openings or fields such as mourning warblers and Chestnut-sided warblers.

Effects of Alternative 3 on MIS

Effects to MIS would be similar to Alternative 2 except that no paper birch regeneration age habitat is created so there would be no benefits for ruffed grouse now or broad-winged hawks in the future. Less habitat would be available for species associated with northern hardwoods regeneration such as the chestnut-sided warbler and less enhancement of spruce/fir and the rresultant benefits for snowshoe hare would occur.

This alternative retains more potential nesting habitat for northern goshawks and more American marten habitat than under Alternative 2, but less than Alternative 1.

Effects of Alternative 4 on MIS

The direct and indirect effects under this alternative would be very similar to those identified for alternative 2. Promoting softwood habitat on 263 acres benefits snowshoe hare and Cape May warblers and supports the Canada lynx conservation strategy. In addition, a forested habitat is maintained for species such as American marten though preferred habitat is reduced by 13% within the managed lands of the HMU.

This alternative increases northern hardwood unevenage habitat by 317 acres and softwood (spruce/fir) habitat by 263 acres and benefits species requiring early successional habitat such as chestnut-sided warblers on 119 acres of created openings. The effects of human use and access would be less than described under Alternative 2.

Cumulative Effects of the action alternatives on MIS

Forestwide habitat and population trends of MIS are discussed in the affected environment section above. Alternative 2 and 4 would benefit MIS associated with regeneration-age habitat including chestnut-sided warbler, mourning warblers, ruffed grouse, and other species that utilize this age class or prefer shrubby openings. Roughly 85% of the Neotropical migratory birds that breed in the White Mountain National Forest utilize early successional habitat. (DeGraaf et. al. 1992).

The forest-wide cumulative effects of the action alternatives are the same as the direct and indirect effects for this project. Uneven-aged management would maintain a forested habitat that would benefit species such as marten and northern goshawks, black bear and deer. Marten and northern goshawk would still have suitable habitat on approximately 86% of the managed lands within the Analysis Area

after harvest. The Action alternatives, especially Alternatives 2 and 4, would provide improved diversity of habitat for MIS species.

None of the MIS species are expected to have its viability jeopardized. No species would be affected to the point that viability becomes a concern. Implementation of any of the action Alternatives would not alter current population trends on the Forest because the project is such a small portion of the overall ranges of these species.

3.8.2 Other Habitat of Concern

The New Hampshire Natural Heritage Bureau (NHNHB), a division of the State Department of Resources and Economic Development, in conjunction with The Nature Conservancy, conducted floral field surveys of the analysis area for threatened, endangered and sensitive species in 1996 and 2000 (Nichols and Sperduto 1996 and Crowley 2000).

A Boreal/transitional acidic exists between FR 17 and Slippery Brook near Unit 6. There would be no direct, indirect or cumulative effects on this exemplary community from any of the Alternatives. See Figure 13, Wetlands and NHNHB Communities.

Only one vernal pool was located and is avoided.

Typical landing with dense hardwood re-vegetation, ten to 15 years following its last use. Photo shows how quickly new regeneration and forest litter and duff stabilizes exposed forest soils.

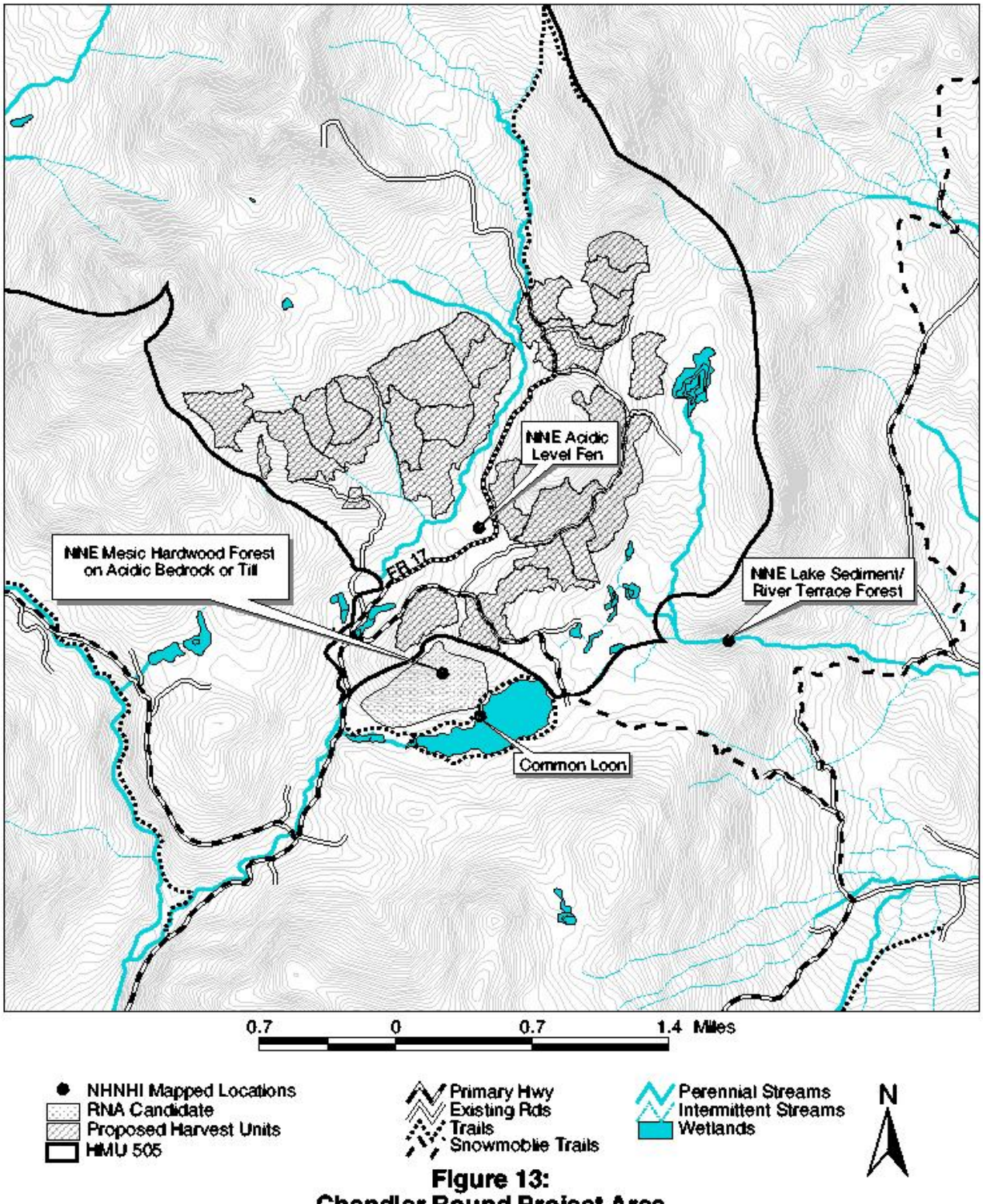

Figure 13:
Chandler Round Project Area
Wetlands & NHNHI Communities

3.8.3 Other Species of Concern

The WMNF conducted a Species Viability Evaluation (SVE) for species that might have potential viability concern on the WMNF in 2002 (USFS 2003). The list was narrowed down to 49 species with a probability of occurence on the Forest whose viability, range-wide or on the Forest, is a concern now or in the next 20 years, or whose viability might become a concern depending on factors that WMNF management could impact (Appendix A).

Of the 49 species analyzed, the bay-breasted warbler (*Dendroica castanea*), American marten *(Martes americana)*, Pickering's reed bent-grass *(Calamgrostis pickeringii)*, northern wild comfry *(Cynoglossum virginianum var. boreale)*, rock goldenrod *(Soldago calcicola)*, and ciliated aster *(Symphyotrichum ciliolatum)* may be present in the analysis area (Appendix A).

Bay-breasted warbler (*Dendroica castanea)*

This species is occasionally found in mixed forest adjacent to ponds, and in this analysis area, at higher elevations above proposed project area. Marginal habitat currently exists in units 3, 6, 8, 14, 17 and 18. Limiting factors may be availability of large unbroken tracts of mature forest, spruce/budworm spraying, and deforestation and subsequent development of its wintering grounds. The bay-breasted warbler is probably limited most in New Hampshire by the availability of mature spruce-fir forest and the lack of a recent spruce-budworm outbreak.

Alternative 2 would improve habitat in all units that promote spruce/fir habitat (Units 3, 6, 8, 14, 17 and 18). Alternative 3 would improve habitat only in Units 3 and 6, with no change occurring in the other softwood/mixedwood units. Alternative 4 would improve habitat in Units 3, 6, 14, and 17.

Breeding Bird Survey data (1980-1994) showed a continent-wide 12.2% decrease for this species. Surveys show that population increases and decreases are dependent on outbreaks of spruce budworm. WMNF breeding bird surveys showed a mean number of individuals per 15 point transect of 2 in 1997; the mean was less than 1 in 1992-96 and 1998-99 (USFS 2003).

Pickering's reed bent-grass *(Calamgrostis pickeringii)*

None of the alternatives would have a direct, indirect of cumulative effect on Pickering's reed bentgrass.

Northern wild comfry *(Cynoglossum virginianum var. boreale)*

The No Action alternative would have no effect on Northern wild comfry. All of the action alternatives may enhance habitat within the HMU for this species because any disturbance that creates a canopy opening and increased light would be beneficial to this species (SVE panel 2002). The Cumulative Effects of the action alternatives would in turn potentially increase habitat and presence of this species.

Rock goldenrod *(Soldago calcicola)*

The No Action alternative would have no effect on rock goldenrod. Alternative 2 would create 200 acres of suitable early successional habitat. Alternative 3 would create 50 acres, and Alternative 4, would create 119 acres of suitable early successional habitat. In addition, the action alternatives create 10 acres of permanent wildlife openings that may provide suitable habitat. The Cumulative Effects of the action alternatives would be the same.

Ciliated Aster (Symphyotrichum ciliolatum)

There is one historic report from Franconia, New Hampshire in the WMNF from 1896. The probability of this species occuring within the project area is extremely low even though habitat appears present. The Cumulative Effects of the action alternatives would increase suitable habitat (brushy or open areas with disturbed soils).

3.8.4 Invasive Species

The White Mountain National Forest has been working with The New England Wildflower Society to determine locations of invasive noxious plant species (Map in Project File). The majority of locations observed have been on the perimeter of the WMNF primarily along roads, highways and in developed areas such as towns, housing developments, recreational areas, etc. The WMNF's objective is to retain a natural ecosystem by limiting spread of invasive species onto the Forest. Invasive plants are spread by wind, water, wildlife, and humans or vehicles transporting seeds or vegetative parts. Invasive plants tend to establish on areas where soils are disturbed, where mineral soil is exposed to sunlight.

Two species have been observed within the project area. Coltsfoot (*Tussilago farfara*) exists on several gravelly point bars in Slippery Brook. Black locust (*Robinia pseudoacacia*) is growing just below the proposed bridge-crossing site on Slippery Brook. Under all alternatives including the No Action Alternative, efforts would be made to eradicate these invasive plants. Interaction of harvest or other heavy equipment and known invasive sites would be kept to a minimum to avoid further spread. Eradication by digging up plants and roots, covering infested areas with black plastic, or brushing repeatedly to supress growth would reduce these small areas of invasive plants over several years.

Direct and Indirect Effect on Invasive Plants
Alternative 1: No Action
There is no increased potential for invasive plants to spread into the Project Area under this alternative.

Alternatives 2, 3 and 4
There would be an increased potential that more species could be spread into harvest areas by heavy equipment, or natural spread by wind, water or wildlife following treatment due to the exposure of mineral soil for germination, especially in units where canopy closure is reduced.

The spread of existing populations of invasive plants is greatest along roads, at the bridge construction site on Slippery Brook, and in clearcut harvest units within one to two years after harvesting. Alternative 2 would create the most clearcut and group openings and therefore have the greatest potential for invasive plant establishment, with less opportunity for alternative 4, then 3 then 1. Maintaining a 50-100-foot buffer of vegetation that creates continuous shade between roadways and trails and proposed clearcuts would minimize potential spread into harvest units.

The required cleaning of logging equipment prior to entering the Project Area would reduce the potential introduction of new invasive plants. Gravel for road work, should be determined to be free of invasive species prior to transporting and use on National Forest land.

Cumulative Effects

Multiple use management allows a wide range of uses on the land, which increase the potential of invasive plants becoming established. Any of the action alternatives would increase the potential for

invasive species to become further established. Most known locations of invasive plants occur in the highly developed landscapes outside of the National Forest boundary. There are indications that these known populations of invasive species are beginning to expand into adjacent forested habitats. This has been kept to a minimum in the past due to the inherent stability of closed-canopy ecosystems; and the prevalence of invasive species that desire open-canopy habitats.

3.9 Fisheries

Affected Environment

Slippery Brook and McDonough Brook are the main watersheds of the analysis area (HMU 505). Slippery Brook is a subwatershed of the East Branch of the Saco River (3rd to 4th order stream) while McDonough Brook flows eastward into the Little Cold River and then into the Saco River. Small tributaries exist for these brooks however none of them are named on USGS maps.

Past stream inventories of Slippery Brook within the Analysis area recorded the presence of eastern brook trout (*Salvelinus fontinalis*) and dace (*Rhinichthys spp.).* Young of the year were observed indicating spawning habitat is present. Stocking records from the State of New Hampshire show that brook trout are stocked annually in Slippery Brook. Brook trout are the Management Indicator Species for lakes, ponds, and stream habitat on the White Mountain National Forest.

Efforts are underway to restore Atlantic salmon (*Salmo salar*) in the lower reaches of the Saco River below Hiram Falls, Maine. No Atlantic salmon exist within the Analysis Area.

Inventory records of McDonough Brook indicate brook trout, dace, brown trout (*Salmo trutta*) and rainbow trout (*Salvelinus mykiss*) exist. The latter two species are stocked in the Saco River. Only brook trout are present in the headwaters of McDonough Brook.

Other aquatic species observed during surveys were green frogs, wood frogs, spring salamanders, dusky salamanders and northern two lined salamanders. Numerous macroinvertebrates were observed.

Fish habitat improvement projects conducted in Slippery Brook first occurred in 1990 involving rip-rapping the stream bank where the slippery Brook crossing is proposed. The second project was located just upstream and involved placing logs in a manner to collect sediment and narrow the stream channel. The third project attempted to extend the rip-rap further downstream at the bridge site because erosion occurred where the rip-rap stopped. In addition to the rip-rap, cover structures were placed in this open area to increase the amount of cover and shade.

Two major flood events in the fall of 1995 altered the improvement project sites. Scouring deposited an extreme amount of sedimentation at the proposed bridge-crossing site. In addition, more bank erosion below the rip-rap site occurred. A heavy spring thaw in 1998 (after the ice storm) further eroded the streambank below the rip-rap. No further streambank or fisheries projects have been conducted.

Factors that are important to maintain quality habitat for brook trout include cool continuous flowing water, unimpeded travel upstream and downstream, clean gravels for spawning and egg incubation, clear water during the growing season, instream cover, adequate food supply (usually macroinvertebrates), high quality headwater streams, and suitable riparian habitat.

The desired condition for fisheries/aquatic resources of all of these streams is to meet Forest Standards and Guidelines identified in the Forest Plan for water quality, riparian, fisheries, and aquatic habitat management (USDA Forest Service 1986 (Forest Plan) III, 15 a-d, 16, 19, 20).

3.9.1 Direct, Indirect and Cumulative Effects on Fisheries

Effects of Alternative 1 (No Action)

This alternative would have no direct effects on fisheries habitat in the analysis area.

Effect of Alternatives 2 and 4

These alternatives require the same amount of road, culvert and bridge construction and would therefore have similar effects to brook trout. Direct effects to fish habitat from turbidity caused during harvest and road restoration maintenance, skid crossings, or culvert and bridge installation and removal may temporarily displace fish and other aquatic life. Indirect adverse effects could include increased sedimentation and/or water temperature increases in perennial and intermittent streams, which could reduce the quality of habitat for fish and other aquatic life.

Forest Plan Standards and Guidelines and mitigations (see section 3.4, Water and Appendix D) would provide erosion control at stream crossings, skid trails, and at landings and would decrease these effects.

The Slippery Brook bridge crossing which would provide access to FR 17A is the most likely location for direct effects to the fishery. Installation of the temporary bridge would require heavy equipment which could displace brook trout at this site. Placement of this temporary bridge requires a 60-80 foot ramp on the east side, within the floodplain. The ramp would be made of large rock and gravel and would contain numerous culverts to allow for water passage at high flows. However, during high flow or rain events sedimentation may occur. If this occurs between October and May, sedimentation could suffocate eggs laid in spawning gravel. For this reason, placement of temporary bridges where direct effects to stream or streambanks can occur is prohibited from May to October.

Population studies done before and after the high flood events in October of 1995 showed a large decrease in the number of young-of-the-year in 1996. However, population surveys in 1997 showed a full recovery to pre-flood levels. Therefore, it is assumed a high flood event with a large degree of sedimentation would have a temporary negative effect on brook trout populations but would not lead to a viability concern.

This Alternative requires the construction of three additional temporary bridges over unnamed tributaries. No abutments are proposed as the bridges would be wide enough to span from bank to bank. Streambanks would not be disturbed therefore no erosion or sedimentation is expected. The bridges would be removed upon completion of the harvest.

All of the Action Alternatives propose removal of an existing bridge across Slippery Brook at the end of FS 17 just beyond Unit 9. Currently the bridge is constricting stream flow in Slippery Brook and acting as a debris jam creating side channels to form. Removal of the bridge would cause some initial disturbance and sedimentation, however the long-term benefits retaining one main channel would benefit brook trout.

Alternative 3

Under this alternative no harvest would occur on the west side of Slippery Brook. This eliminates the need for the temporary bridge to access FR 17A. In addition no other temporary bridges would be

required under this alternative. This would retain the streams in their current conditions with no effects to brook trout.

Cumulative Effects for All Alternatives

Historical logging practices likely had an adverse effect on instream habitat conditions in New Hampshire (Taylor et al. 1996). Stream inventories conducted across the White Mountain National Forest indicate that most streams have suitable instream habitat needed by brook trout, including cold water temperatures and good hiding cover. However there continues to be a lack of habitat diversity with the percentage of pools far lower than recommended guidelines (USFS 1996).

Brook trout have been monitored at nine sites across the Forest since 1992. None of the sites showed increasing or decreasing densities over the sampling years. Trout productivity was similar to other areas of New Hampshire (USFS 1999). Data collected on the Forest from 1992-1999 shows that land use activities are not influencing fish populations. Wild brook trout populations are viable in all the major watersheds of the White Mountain National Forest. (USFS 2001).

The proposed alternatives, along with any reasonably foreseeable future harvesting activities in the analysis area, should not have any measurable effect on current instream habitat conditions. The alternatives would maintain recruitment of large woody debris into streams. This may increase instream habitat diversity due to pool formation which provides refuge (Likens and Bilby 1982) and therefore, decrease population fluctuations (USDA Forest Service 2001). No harvests are planned in Slippery Brook or McDonough Brook for the foreseeable future. Snowmobile use and possibly mountain biking and hiking use in the area may increase. Still, the alternatives would add little cumulatively because the affected area is extremely small compared to the overall length of these streams. Implementation of these alternatives would not cause a change in the Forest or regional brook trout population trends nor stream habitat trends. Brook trout would remain viable under any alternative.

3.10 Federal Threatened, Endangered & Proposed Species (TEPS), Regional Forester Sensitive Species (RFSS), and Rare Communities

A Biological Evaluation as required by Forest Service Manual 2673.4 and Section 7 of the Endangered Species Act, was prepared for all Alternatives and is located in the project file. It deals with Federally Listed Species as well as species contained on the Regional Forester's Sensitive Species List. The process used and the sources examined to determine potential occurrence of TEP or RFSS presence are listed in the BE.

The most recent USFWS species list was received in May 2003. The Chandler Round Project BE will be submitted to USFWS for written concurrence on the determinations for federally listed species."

Based on a pre-field review of all available information, it was determined that potential habitat may occur within the Project Area for one Federally Endangered Species (Indiana bat), and six Regional Forester Sensitive Species (eastern small-footed myotis (*Myotis leibii*), northern bog lemming (*Synaptomys borealis sphagnicola),* Bailey's sedge (*Carex baileyi),* squirrel corn *(Dicentra*

Canadensis), American ginseng (*Panax quinquefolius*), and nodding pogonia *(Triphora trianthophora).* Potential habitat for Canada lynx is present in the analysis area however the species are not considered to be present. The BE also analyzes the effects of the action alternatives and whether they comply with the Canada Lynx Conservation Assessment and Strategy.

There is a risk of unintentional damage to individual TEPS plant species not discovered prior to project implementation (FEIS IV-68, USDA Forest Service 1986b).

The WMNF contains no designated critical habitat for any federally listed species. The expected adverse or beneficial effects to the Indiana bat were determined to be small and "discountable" (defined as those effects that are extremely unlikely to occur). There may be minimal direct and indirect effects to eastern small-footed myotis foraging and roosting habitat. There is a slight potential for the Action Alternatives to displace northern bog lemmings, although the potential for presence of this species in the Project Area is low. Bailey's sedge, squirrel corn, American ginseng and nodding pogonia may be directly or indirectly impacted by any of the Action Alternatives, however the potential of their presence in the Project Area is low.

Biological Evaluation Effects Determination and Rationale

Canada lynx

All Alternative would have *no effect* on Canada lynx since this species is not considered to be present on the White Mountain National Forest. All Alternatives are consistent with the conservation measures outlined in the Canada lynx Conservation Assessment and Strategy (BE, Project File).

Rationale

- Several surveys conducted on the WMNF over the past two decades have not shown Canada lynx to be present.

Indiana bat

All alternatives *may effect, but would not likely adversely affect* Indiana bat. The likelihood of occupancy by Indiana bat is extremely low in the Project Area, therefore any effects to Indiana bat from any Action Alternative would be insignificant (cannot meaningfully measure or detect) and therefore discountable (not expected to occur). All Alternatives are consistent with the Terms and Conditions from the Biological Opinion for Indiana Bat.

Rationale

- The Project Area is located at the northern end of the Indiana bats' summer range. The habitat consists of mature northern hardwoods, mixedwood and softwood with a canopy closure often exceeding 80%. Indiana bats prefer roosting and foraging in canopy closure ranging from 50% to 70%. The likelihood of Indiana bats occurring in the Project Area is extremely low.
- Forest Plan Standards and Guidelines (USFS 1986a) maintain adequate habitat for Indiana bat by providing direction to maintain a diversity of habitat conditions well distributed across the Forest (USFS 1986a III-13), reserve large wildlife trees in areas managed for vegetation, retain standing dead trees where possible (III-15), and maintain riparian habitats (III-18). Implementing the Terms and Conditions outlined for Indiana bat in the Biological Opinion (USFWS 2000), as incorporated in the Forest Plan Amendment (USFS 2001), should also maintain habitat components needed by Indiana bat and minimize the potential for incidental take of an Indiana bat.

Eastern small-footed myotis

There would be *no impact* to eastern small-footed myotis from the No Action Alternative. All Action Alternatives *may impact* this species, *but would not likely cause a trend toward federal listing or loss of viability*.

Rationale

- Most literature indicates that eastern small-footed myotis roost in cracks and crevices in rocky outcrops, on talus slopes, under rocks on hillsides and open ridges and in buildings (Erdle and Hobson 2001). The likelihood that individual bats are roosting in trees in the Project area is considered low.
- Forest Plan Standards and Guidelines (USFS 1986a) maintain adequate habitat for eastern small-footed myotis by providing direction to maintain a diversity of habitat conditions well distributed across the Forest (USFS 1986a III-13), reserve large wildlife trees in areas managed for vegetation, retain standing dead trees where possible (III-15), and maintain riparian habitats (III-18). Implementing the Terms and Conditions outlined for Indiana bat in the Biological Opinion (USFWS 2000), as incorporated in the Forest Plan Amendment (USFS 2001), should also maintain habitat components needed by eastern small-footed myotis.

Northern bog lemming

The No Action Alternative would have *no impact* on northern bog lemming. All Action Alternatives *may impact individual northern bog lemmings, but would not likely cause a trend to federal listing or loss of viability*.

Rationale

- Northern bog lemmings are rare in New England. The likelihood of an individual occurring in the Project Area is considered low.
- Identifiable riparian habitat or wet areas are usually excluded from harvest units minimizing the risk of disturbing an individual animal or associated habitat.
- Forest Plan Standards and Guidelines maintain a diversity of habitats (1986a III, 12-13) and protect riparian habitat (III-19). It is expected these would minimize negative effects and provide adequate habitat for the northern bog lemming.

Bailey's sedge

The No Action Alternative would have *no impact* on Bailey's sedge. All Action Alternatives *may impact individual stems of Bailey's sedge but would not likely cause a trend to federal listing or loss of viability*.

Rationale

- Bailey's sedge is on the northern edge of its range in New England and may be naturally rare here being suitable habitat appears plentiful.
- Identifiable wet seepy areas are usually excluded from harvest units minimizing the risk of disturbing individual plants or associated habitat.

- Forest Plan Standards and Guidelines maintain a diversity of habitats (Forest Plan III, 12-13) and protect wet areas (Forest Plan III-19). Roadside ditches, log landings, and wildlife openings would continue to provide suitable habitat for this species even if harvest occurs.

Squirrel corn

The No Action Alternative would have *no impact* and *all Action Alternatives may impact individual plants of squirrel corn but would not likely cause a trend toward federal listing or loss of viability*.

Rationale

- Squirrel corn is naturally rare due to its dependence on calcium rich habitat which is not common.
- Forest Plan Standards and Guidelines maintain a diversity of habitats (Forest Plan III, 12-13) and protect highly enriched and wet areas (Forest Plan III-19).

American ginseng

The No Action Alternative would have *no impact* and *all Action Alternatives may impact individual plants of American ginseng but would not likely cause a trend toward federal listing or loss of viability*.

Rationale

- Additional surveys for this species prior to harvest would assure potential impacts are minimal.
- Forest Plan Standards and Guidelines maintain a diversity of habitats (Forest Plan III, 12-13) and protect highly enriched and wet areas (Forest Plan III-19).

Nodding pogonia

The No Action Alternative would have *no impact* and *all Action Alternatives may impact individual plants of nodding pogonia but would not likely cause a trend toward federal listing or loss of viability*.

Rationale

- The nodding pogonia is typically uncommon in the area because the WMNF is in the northern part of its range. It typically occurs in second growth beech forests so it is unlikely that logging activity would cause long-term negative effects to this species.
- Forest Plan Standard and Guidelines to protect and enhance habitat for sensitive species will ensure that this plant is protected if found in any proposed harvest unit.

3.11 Heritage Resources

3.11.1 Direct, Indirect and Cumulative Effect on Heritage Resources for all Alternatives

The analysis area was surveyed by a cultural resource Para-professional in 2000. Two identified sites near Mountain Pond would be avoided under all alternatives. There are currently no National Register of Historic Places within the analysis area.

Any cultural resource exposed by or otherwise discovered during sale activities would require immediate cessation of operations and notification of the Forest Service. Cultural resource specialists would evaluate the site and recommend measures needed to protect it from disturbance.

Since no direct or indirect effects to heritage resources and no prehistoric sites are known to be within or adjacent to proposed harvest units, no cumulative effects to cultural resources would occur.

The following steps were followed to survey for cultural resources within the Project Area:

1) Research was conducted prior to field review to identify cultural resources sites within the area. The cultural resource paraprofessional consulted District cultural resource maps, atlases, and files, and additional historic documents.

2) The cultural resource paraprofessional conducted a thorough walk-through of each unit in the proposal with particular attention to areas near streams, on benches or other flat areas, rock outcroppings and ledges.

3) The Forest Archeologist reviewed the cultural resource report.

4) The State Historic Preservation Officer (SHPO) reviewed the cultural resource report and provided concurrence on January 27, 2003.

View south to the project area, and Slippery Brook drainage, from South Baldface Mountain, 2003. Note Round Mountain in the middle right, and the flank of Eastman Mountain to the left.

3.12 Vegetation

Affected Environment

Management Area 3.1 lands are divided into uneven-aged and even-aged management systems. Unevenaged lands are managed with uneven aged silvicultural prescriptions such as single tree selection or group selection. See Appendix C for a description of the harvest treatments. Even-aged lands in this project are managed with thin or clearcut harvest prescriptions.

Compartments 86, 87, 89, 90, 91, and 133 comprise HMU 505, and sum to 5,587 acres of Management Area 3.1 lands. There are no MA 2.1 lands within the HMU. MA 6.1 and 6.2 lands encompass an additional 2,788 acres or 33% of HMU 505. The primary community type is northern hardwood totaling 4,085 acres. This HMU is one of few on the Saco District that contain paper birch stands. Spruce/fir and hemlock are also present. Many stands are on ELTs that promote sugar maple and ash.

The Analysis Area for direct and indirect effects on vegetation is HMU 505, encompassing 8,375 acres. Of this, 7,975 acres (95 percent) of the HMU is in a closed-canopy forest of young, mature and overmature even-aged and uneven-aged stands. The large amount of closed canopy within this HMU indicates ample structural diversity for wildlife and a minimum amount of fragmentation of the forested landscape. The remaining 400 acres, (5%) are in early successional habitat condition, have developed into young sapling stage stands (former openings), or are open ledge on South Baldface.

All units within MA 3.1 and HMU 505 that have been identified for vegetative treatment are either overstocked and contain trees of low timber quality, are approaching an age and condition where mortality is imminent (including ice damage related mortality), or would benefit from removal of overstory hardwoods in mixedwood and hardwood stands where older dominant hardwoods overtop a healthy thrifty midstory and understory. Many of these stands have moderate to severe crown damage throughout the stand. According to the *Silvicultural Guide for Northern Hardwood Types in the Northeast* (Leak et al. 1987) and *Silvicultural Guide for Paper Birch in the Northeast (revised)* (Safford 1983) commercially treating these stands would improve the quality and vigor of remaining trees.

The Analysis Area for cumulative effects on vegetation also encompasses HMU 505 and adjacent private lands. The cumulative effects analysis considers activities ten years in the past and ten years in the future (1993 to 2014). Ten years was the time period selected because it represents the length of time after a stand is harvested when it is considered in the regeneration phase of development, meaning the canopy is not fully closed and sunlight can reach the ground.

Within HMU 505, harvesting on National Forest MA 3.1 lands totaled 277 acres over the past 10 years, or 16.5 % of the allowable harvest acres. Of this, 214 acres was even-aged management and 63 acres was individual tree selection. There is no evidence of abnormal residual damage from previous harvest activities. Some of the clear cut and partial cut treatments are adjacent to harvest units proposed in this action.

Some of the units proposed for treatment in this project show evidence of previous entry. Entries appear to be from twenty to forty years ago. Many of the units only show indirect evidence of entry, in that the size and age of trees being eighty to ninety years old with some older remnants. These average forest

stand ages indicate turn of the century harvesting occurred in the project area. Other evidence used to date entries in these stands are derived from stand records and confirmed with on site inspection of the stands, associated skid trails and landings.

Table 24. Stand Objectives – Chandler Round Project (HMU 505)

Units	Stand Type	Treatment Objective	Comments
1, 6, 8, 14, 17, 18	Even-aged Mature Mixedwood	Uneven aged - Enhance softwood, and softwood regeneration development	Apply small group selection openings, and single tree selection between openings to increase age diversity, promote softwood and quality hardwoods, and harvest high-risk trees.
3, 4, 5, 11, 13, 19, 20, 23, 24, 28, 29, 31	Even-aged mature and overmatureHardwood	Uneven-aged quality hardwood release, and hardwood regeneration development	Group selection openings, and single tree selection between openings,would be applied to move these mature and overmature northern hardwood stands into uneven-aged condition, while removing high risk trees and creating desired species of hardwood regeneration.
9, 12, 15, 16, 21	Even-aged Hardwood	Thin to increase development of quality hardwoods	Increase growing space and health of the stand, harvest high risk trees and low quality trees. Favor softwoods where found.
10	Even-aged Mixedwood	Softwood and hardwood development	Thin to increase growing space and health, harvest high risk trees and low quality trees. Favor softwoods.
2, 7, 22, 25, 26, 30	Even-aged Hardwood	Even-aged hardwood regeneration and early successional habitat	Create early successional habitat with Clearcuts; maintain ¼ to ½ acre reserve areas for each ten acres cut; and retain wildlife trees within the units.

Overall stand conditions are poor in units 2, 3, 4, 6, 7, 10, 11, 12, 13, 15, 16, 20, 21, 23, 24, 26, 28, 29 and 30 due to moderate to severe ice damage. In some, severe crown damage combined with previous harvesting resulted in obvious needs for treatment. Natural advanced regeneration in these areas include primarily beech but also striped maple and sugar maple. Canopy conditions favor beech over sugar maple. One of the treatment objectives is to foster sugar maple regeneration by opening the canopy to allow more sunlight, and also to foster regeneration of sugar maple, ash and oak by scarifying soils. Soil scarification that exposes mineral soil allows for germination of these species, and greatly influences the resultant species composition or the regeneration. Soil scarification is important in these units, and is accomplished with summer and fall operating seasons where other resource considerations allow.

Natural regeneration of hardwood and softwood species at desired stocking levels within existing clearcuts and individual tree selection units is evident.

Private lands near the National Forest (representing 4 percent of McDonough watershed - but not in this HMU) retain a partially forested canopy. These private lands appear to be selectively harvested over time. No evidence of development for residential housing is evident within these private lands.

3.12.1 Direct and Indirect Effects on Vegetation

Summary of Direct & Indirect Effects on Vegetation

Analysis Area		Estimated Acres
National Forest lands designated as MA 3.1 in HMU 505		Approximately 8,375 NF acres

Alternative	Summary of Direct & Indirect Effects
1	Natural processes continue, No effects from logging or road restoration, No change in age class or structural diversity
2	Even-aged regeneration on 200 acres of hardwoods and paper birch; enhance softwood composition on 200 acres of single tree selection and 35 acres of thinnings; and enhance timber quality and species composition on 379 acres of uneven-aged harvest and 162 acres of even-aged thinning
3	Even-aged regeneration on 52 acres of hardwoods and paper birch; enhance softwood composition on 56 acres of single tree selection and 35 acres of even-aged thinning; and enhance timber quality and species composition on 237 acres of uneven-aged harvest
4	Even-aged regeneration on 121 acres of hardwoods and paper birch; enhance softwood composition on 183 acres of single tree selection and 35 acres of thinnings; and enhance timber quality and species composition on 413 acres of uneven-aged harvest and 175 acres of even-aged thinning

Alternative 1: No Action Alternative

There would be no direct effects from timber harvest and road restoration activities, such as openings in the forest canopy, residual tree damage or soil compaction. Any openings in the forest canopy would be the result of natural mortality of standing trees or disturbance (wind event, infestation, individual tree mortality). There would be no indirect effects from timber harvest, road restoration activities, placement of temporary bridges, and no new stands of regenerating hardwoods, increases in softwood composition, or increased timber quality in the residual stand. Age class and structural (canopy) diversity would change through natural processes.

Alternative 2: Proposed Action

Stands with prescriptions for individual tree and group selection harvest would create ¼- to 2-acre openings to release or regenerate softwood and shade intolerant hardwood species in mixedwood stands. Group selection and single tree selection cuts are a typical harvest method used in mixedwood or hardwood stands where un-even aged conditions are desired. On average in Chandler Round Project, group selection openings would harvest approximately 20 percent of the unit acreage. These treatments would move toward an uneven-aged stand condition. Subsequent entries over the one hundred year rotation period would treat additional portions of the stand and create a multi-aged condition. Overall stand health and vigor would improve, resulting in increased growth on quality residual trees.

Single tree selection treatment between the group selection openings would maintain stand health and reduce basal area in these areas. To create an uneven aged stand condition, trees of all age classes would be retained to meet the target basal area. This would remove some mature and understory trees, provide additional sunlight to new regeneration (so as to compete with advanced beech regeneration), enhance vertical structure, and promote softwood regeneration.

Clearcut prescriptions would create early-successional wildlife habitat by removing trees and creating regenerating openings. Clearcuts are located in areas where high risk and low quality trees comprise a large percentage of the stand. Alternative 2 proposes ten acres as permanent wildlife openings. .

Clearcutting northern hardwood stands can promote stump sprouts in species such as ash, maple, birch and basswood. According to a study on four sites in New England, *Whole-tree Clearcutting in New England: Manager's Guide to Impacts on Soils, Streams, and Regeneration* (Pierce et al. 1993*),* stump sprouting and germination of new seedlings begins in the first growing season after harvest. Within five years after cutting, young, dense regenerating stands are established.

Summer harvesting would be allowed in clearcuts and Group selection/STS cuts where scarification of soils would increase regenerating species diversity. Increased hemlock, sugar maple, yellow and paper birch seedling germination is expected in scarified areas. Bark damage in these units is not expected to be an issue with proper skid trail location and proper skidding techniques. Many hardwood species and herbaceous plants including raspberry, which provide berries for birds and bears, and leaves for deer, re-colonize these areas a short time afterwards (Whitman and Hagan 2000). To minimize damage to residual trees, existing skid trails would be used and new trails designated prior to operations.

Indirect effects include an increased risk of windthrow in Single tree selection stands and along the borders of clearcuts and group selection openings. Some residual tree damage would occur during harvesting operations, but skid trails are often planned adjacent to trees marked for removal, in order to provide adequate working space for logging equipment.

The wildlife openings would be maintained by mowing or prescribed fire every 3-5 years to discourage growth of woody vegetation and favor herbaceous plant species such as goldenrod and raspberries. Precautions are taken during prescribed burning to prevent residual tree damage adjacent to the opening.

Alternative 3

The beneficial and potential adverse effects of alternative 3 are reduced from those shown for Alternative 2 because many fewer acres are treated. The effects would apply to 380 acres proposed for harvest and the associated skid roads, landings and ten acres in wildlife openings.

Alternative 4

The effects of alternative 4 are nearly the same as Alternative 2 because nearly the same number of acres are treated, however, several units are omitted, and the prescription changed to group selection with single tree selection for some of the clearcuts. See the alternative description in Chapter 2 section A, and the associated Tables 2, 3 and 4. The effects would apply to 927 acres proposed for harvest, and the associated skid roads, landings and ten acres in wildlife openings.

3.12.2 Cumulative Effects on Vegetation

Summary of Cumulative Effects on Vegetation

Analysis Area		Estimated Acres
Public lands within HMU 505, and nearby private lands	1993-2004 Present 2004-2014	Approximately 8,375 acres of public land and 450 acres of private land near the HMU

Alternative	Summary of Cumulative Effects
1	Natural processes continue, No effects from logging or road restoration, Continued succession towards mature forest, Loss of species diversity
2	Regeneration due to even-aged harvest and natural disturbance contributes incrementally to fragmentation of closed forest canopy in Analysis Area, but within levels anticipated and analyzed in FEIS for 1986 Forest Plan. Increases early-successional habitat and species, age and structural diversity
3	Fewer acres of even-aged harvest than Alternatives 2 & 4 means less incremental fragmentation, fewer acres of early-successional habitat, and less acheivement of forest health, regeneration and softwood (species diversity) objectives in HMU 505
4	Similar to Alternative 2, with fewer acres of even-aged harvest

Other than the Proposed Action and its alternatives, the Forest Service does not anticipate other timber harvest within HMU 505 through 2014, except possibly in the East Fork of the East Branch Saco watershed, off Forest Road 38. That area is not treated in this project (see section 3.1.2, Cumulative Effects on Roadless and Wilderness – past, present, and reasonably forseeable future harvest).

Alternative 2, with the most acres proposed for harvest, still falls short of the Desired Future Conditions for MA 3.1 in HMU 505. As a result, even when considering timber harvest on lands outside the Analysis Area, the Proposed Action and its alternatives are well within the effects anticipated and analyzed in the Final Environmental Impact Statement for the 1986 Forest Plan that provides programmatic direction for timber harvest on the White Mountain National Forest.

Alternative 1: No Action Alternative

This alternative will not contribute incrementally to the effects of timber harvest or land clearing within the Analysis Area over the 20-year period from 1993-2014. Without timber harvest now or over the next 10 years; species, age class and structural diversity will develop naturally on National Forest lands within HMU 505. Diversity may be enhanced by natural disturbance, such as a weather event, fire, disease or an infestation that can create forest openings and provide some limited opportunities for shade intolerant plant species. Currently regenerating and young stands will age and grow pole sized closed canopy condition. This will reduce early-successional habitat for wildlife. Mature stands of the short-lived (50-60 years) paper birch and aspen community types will continue to age towards mortality, many to be replaced by shade tolerant species now growing in the understory of these stands.

Action Alternatives 2-4

The Action Alternatives will contribute incrementally to the effects of timber harvest and opening creation within the Analysis Area over the 20-year period from 1993-2013; however, these effects are well within the effects anticipated and analyzed in the Final Environmental Impact Statement for the 1986 Forest Plan.

The Forest Plan assigns 5,587 acres to Management Area 3.1 lands within HMU 505. MA 6.1 and 6.2 lands encompass an additional 2,788 acres or 33% of HMU 505. The primary community type is northern hardwood totaling 4,085 acres. Past and current management using both uneven-aged and even-aged silvicultural techniques within the HMU, and on public and private lands surrounding the HMU have had the effect of opening portions of the canopy temporarily in partial cut units, enhancing development of softwoods, and providing for a diversity of age classes and structure by creating openings (clearcuts and group openings) within a forested landscape on an estimated four percent of the analysis area. Table 13 compares the cumulative timber harvesting and other stand regenerating activities on MA 2.1 and 3.1 lands, for all of the alternatives.

In HMU 505, between 1993 through 2014, cumulatively, Alternative 2 proposes to harvest approximately 1,293 acres, or 15% of the HMU. This number of treated acres is 23 percent of the MA 3.1 land in the HMU. Regeneration openings (298 acres) and ten acres of permanent wildlife openings would equal 308 acres, or 5.5 % of MA 3.1 lands in HMU 505, and maintaining 94.5% of MA 3.1 in

closed canopy. This alternative would fall 261 acres short of the DFC for early-successional habitat in this HMU.

In HMU 505, between 1993 through 2014, cumulatively, Alternative 3 proposes to harvest approximately 697 acres, or 8% of the HMU. This number of treated acres is 12.5 percent of the MA 3.1 land in the HMU. Regeneration openings (110 acres) and ten acres of permanent wildlife openings would equal 120 acres, or 2 % of MA 3.1 lands in HMU 505, and maintaining 98% of MA 3.1 in closed canopy. This alternative would fall 449 acres short of the DFC for early-successional habitat in this HMU.

In HMU 505, between 1993 through 2014, cumulatively, Alternative 4 proposes to harvest approximately 1,244 acres, or 15% of the HMU. This number of treated acres is 22 percent of the MA 3.1 land in the HMU. Regeneration openings (219 acres) and ten acres of permanent wildlife openings would equal 229 acres, or 4 % of MA 3.1 lands in HMU 505, and maintaining 96% of MA 3.1 in closed canopy. This alternative would fall 340 acres short of the DFC for early-successional habitat in this HMU.

Typical hardwood regeneration in a clearcut opening created a decade earlier, in a nearby HMU, 2003

Chapter 4 - Preparation and Consultation

4.1 ID Team Members and Forest Service Contacts

The following individuals participated in the development and analysis of the proposed action and the alternatives, as well as project design and preparation of the environmental assessment.

Interdisciplinary Team:

NEPA Coordinator / Silviculture / Layout.....Rod Wilson, Saco Ranger District
Wildlife Biologist.....Kathy Starke, Saco Ranger District
GIS technician / Layout Forester.....Keith Konen, Saco Ranger District
Assistant Ranger / Ecosystems Team Leader.....Rick Alimi, Saco Ranger District
Forest Engineering Technician / Roads Analysis.....Jay Sylvester, White Mountain National Forest
Recreation.....Holly Jewkes, Saco Ranger District
Marking Crew Lead Technician.....Randy Harrington, Saco Ranger District

Forest Service personnel consulted for professional and technical assistance:

District Ranger.....Terry Miller, Saco Ranger District
Silviculture.....Bob Burt, Green Mountain National Forest
Archeologist.....Karl Roenke, White Mountain National Forest
Soils Scientist.....Steve Fay, White Mountain National Forest
Hydrologist.....Tracy Weddle, White Mountain National Forest
Harvest Operations.....Ken Jeager, Saco Ranger District
Archeological Paraprofessional.....Edgar Cormier, Saco Ranger District

Other Agencies Consulted:

New Hampshire Natural Heritage Bureau.....Sara Cairns, Ecologist
New Hampshire Dept. of Fish and Game.....Kristine Bontaites, Wildlife Biologist
U.S. Fish and Wildlife Service.....Susi von Oettingen, Biologist

CHANDLER ROUND
VEGETATION MANAGEMENT PROJECT

Environmental Assessment

APPENDICES

Appendix A: Species with Potential Viability Concerns
Appendix B: Scoping Comments and FS Responces
Appendix C: Harvest Methods
Appendix D: Mitigation Measures
Appendix E: Glossary
Appendix F: References and Literature Cited

APPENDIX A – Species with Potential Viability Concerns

The Forest Plan Revision process for the White Mountain National Forest included an inventory of "Species with Viability Concerns" on the National Forest that are not already listed on the Regional Forester's Sensitive Species (RFSS) list (See Biological Evaluation in Project Planning Record, and Section 3.10 of the EA, for information on RFSS). Effects analysis for Species with Viability Concerns is included in Section 3.7.3 of the EA. The Project Area is the portion of the Analysis Area that includes stands proposed for vegetative management as well as the area associated with connected actions (roads and landings). For each species of concern, this table notes the following:

- Have there been current or historical sightings of the species of concern within the Project Area?
- Is there suitable habitat for the species of concern within the Project Area?
- Have there been surveys conducted within the Project Area for the species of concern?
- Will the proposed project impact the species of concern or its habitat**?**

SPECIES WITH POTENTIAL VIABILITY CONCERNS					
Species	**Habitat Requirements**	**Sightings Present or Historical within the Project Area**	**Suitable Habitat within the Project Area?**	**Project May Impact Species or Habitat?**	**Rationale**
AMPHIBIANS					
Jefferson Salamander *Ambystoma jeffersoniannum*	Mixed wetland and forested habitat. Vernal to semi-permanent pools are preferred breeding areas. Surrounding habitat usually mature forest with rocky soils, a duff layer, pit and mound topography, large (> 10 cm) logs, and relative closed canopy. Usually below 1700' elev. Avoids floodplains.	NO: doubtful occurrence on WMNF (SVE)	Vernal pools may occur in areas with hardpan soils.	NO	In NH, only 1 true individual of this spp has been recorded from the SW corner of the state. Hybrids of this species are more common than not. Probability of true spp. occurrence is extremely low.

SPECIES WITH POTENTIAL VIABILITY CONCERNS					
Species	**Habitat Requirements**	**Sightings Present or Historical within the Project Area**	**Suitable Habitat within the Project Area?**	**Project May Impact Species or Habitat?**	**Rationale**
BIRDS					
Bay-breasted Warbler *Dendroica castanea*	Primarily mature coniferous forests (tho mixed forests used) up to 4000'. Prefers the thick lower vegetation at edges of small forest openings.	NO	YES	YES	Mature spruce/fir and mixedwood in Project Area.
Rusty Blackbird *Euphagus carolinus*	Prefers northern ponds, wetlands, beaver ponds typically between 1000' to 4000' in elev. Nests found in spruce and fir.	NO	YES	NO	Suitable habitat exists in wetland area (Gracie's Meadow and beaver ponds) on east end of Analysis Area. No harvest or connecting activities are proposed in this area.
Three-toed Woodpecker *Picoides tridactylus*	Year-round resident of spruce/fir zone, which typically occurs above 2500'. Breeds in mature coniferous forest with clumps of snags, including at least some 10-12" in diameter. May prefer flooded or swampy areas.	NO	YES	NO	All harvest units are below 2500'. Very marginal spruce/fir habitat and no clumps of large snags.
Pied-billed Grebe *Podilymbus podiceps*	Waterbodies usually ≥ 12 acres with both open water and emergent vegetation.	NO	NO	NO	Gracie's Meadow and beaver ponds may exceed 12 acres when active. No harvest or connecting activities are proposed near wetlands.
FISH					
Atlantic salmon *Salmo salar*	Larger streams of the Merrimack and Connecticut River watersheds. Also Saco River watershed below Hiram Falls.	NO	NO	NO	Project area above Hiram Falls; therefore no salmon present.

SPECIES WITH POTENTIAL VIABILITY CONCERNS					
Species	**Habitat Requirements**	**Sightings Present or Historical within the Project Area**	**Suitable Habitat within the Project Area?**	**Project May Impact Species or Habitat?**	**Rationale**
INSECTS					
Boulder Beach Tiger Beetle *Cicindela ancocisconensis*	Open sand or mix of sand and cobble along permanent streams of mid-sized rivers; feed and live on the sandy areas exposed by receding rivers; common in Saco River basin downstream of WMNF	NO	NO	NO	Slippery Brook flashy and lacks sand deposits. Project would not affect substrate of Slippery Brook within the stream channel except possibly at bridge crossings.
Black lordithon rove beetle *Lordithon niger*	Old growth northern hardwood or mixed coniferous forest below 2500'. Presently known from The Bowl RNA.	NO	NO	NO	No old growth habitat in project area.
A big-headed fly *Nephrocerus slossonae*	Old growth northern hardwood or mixed coniferous forest above 1500'. Non-aquatic. Presently known from The Bowl RNA.	NO	NO	NO	No old growth habitat in project area.
MAMMALS					
American Marten *Martes americana*	Inhabits coniferous, mixed, and deciduous forest that is 30+' tall with at least 80 ft² of basal area. Prefers structural complexity in stands, including large hollow trees or downed logs.	NO	YES	YES	Most of project area has forest 30+' tall with basal area >80 ft².
ODONATES					
Southern Pygmy Clubtail *Lanthus vernalis*	Lives in small, shady spring-fed creeks, preferring clean sandy or mud substrates and shallow water.	NO	NO	NO	No streams with sandy or mud substrates in the project area.
Forcipate emerald *Somatochlora forcipata*	Found in spring-fed steamlets trickling through subalpine hillside fens with floating vegetation or in pools associated with flowing groundwater in fen areas. Avoid open, sunny fen areas. Eggs deposited in mud-bottomed streamlet pools.	NO	Possibly	NO	Boreal acidic-fen within project area but no activity proposed near it. No mud bottom in Slippery Brook within project area.

SPECIES WITH POTENTIAL VIABILITY CONCERNS					
Species	**Habitat Requirements**	**Sightings Present or Historical within the Project Area**	**Suitable Habitat within the Project Area?**	**Project May Impact Species or Habitat?**	**Rationale**
Ebony boghunter *Williamsonia fletcheri*	Found in low elevation sphagnum bogs adjacent to coniferous or mixed coniferous/deciduous forested areas. Absent from most bogs without sphagnum. Larvae may develop in shallow pools (6" to 12") in sedge fens or among sphagnum mats with open pools and not choked with heaths. It appears to utilize openings within the forest rather than completely open upland habitat.	NO	SUSPECT	NO	Boreal acidic-fen within project area but no activity proposed near it.
REPTILES					
PLANTS					
Arabis missouriensis *Arabis missouriensis*	Semi-open conditions of richer sites in the WMNF. Typically south or west-facing slopes below 1500'. Associated spp include red oak, ash, basswood, sugar maple.	NO	SUSPECT	NO	Stands or sugar maple/ash within analysis area but surveys have not documented this species.
Pickering's Reed Bent-grass *Calamagrostis pickeringii*	Acid peats or sands, gravels and shores. Uses a variety of habitats including bogs, wet shores ditches, and dry streambeds, especially in the mountains. Sunny, gravel areas of rivers close to the high water mark. Known from Swift River and Annis Field.	NO	SUSPECT	Possibly at proposed bridge crossing	Boreal acidic-fen may provide suitable habitat. No harvest areas are proposed near this. Slippery Brook may provide suitable gravels. Project would not affect gravels or banks of Slippery Brook except possibly at bridge crossings.
Cut-leaved Toothwort *Cardamine concatenata*	Rich woods, wooded bottoms, and calcareous rocky banks. (In Maine only known on a beech-maple-oak forested, south-facing hillside).	NO	NO	NO	Small areas of rich woods present but not with calcareous soils.
Rocky Mountain Sedge *Carex backii*	Shady calcareous to neutral, dry-mesic, rocky oak-hardwood and limestone hardwood habitat.	NO	NO	NO	No calcareous soils.

SPECIES WITH POTENTIAL VIABILITY CONCERNS					
Species	**Habitat Requirements**	**Sightings Present or Historical within the Project Area**	**Suitable Habitat within the Project Area?**	**Project May Impact Species or Habitat?**	**Rationale**
Hair-like Sedge *Carex capillaris*	All known NH and WMNF occurrences are in alpine habitat.	NO	NO	NO	No Alpine habitat in Project Area.
Head-like Sedge *Carex capitata ssp. Arctogena*	Dry or wet acidic rocky or gravely soil in the alpine.	NO	NO	NO	No Alpine habitat in Project Area.
Scirpus-like Sedge *Carex scirpoidea*	Strongly associated with rocky summits, outcrops, and cliffs. In NH, known from open ledges and subalpine habitats (Mt. Washington, Mt. Webster and Harts Location).	NO	NO	NO	No Alpine habitat in Project Area.
Pale Painted-cup *Castilleja septentrionalis*	Cool, wet ravines, along alpine brooks, and in wet alpine and subalpine meadows. Soil conditions vary by location from moist organic soil to gravelly soil to calcareous cliffs. Good representative of the snowbank/wet meadow/streamside ravine alpine communities.	NO	NO	NO	No Alpine habitat in Project Area.
Northern Wild Comfrey *Cynoglossum virginianum var. boreale*	Can occur in enriched northern hardwood or mesic red oak northern hardwood, as well as transition limestone hardwood forests. It is mainly in rich mesic woods on sandy or rocky soil where light is available to the understory. Favors southern and western aspects. May also occur on ledges.	NO	SUSPECT	*Possibly*	Small areas of enriched hardwoods present. No ledges in project area. Not observed during surveys, but southern aspects and some enriched soils present.
Yellow Lady's Slipper *Cypripedium parviflorum var. pubescens*	Rich deciduous woods and swamps, often along the edges of spring run-off streams.	NO	SUSPECT	NO	Small areas of rich woods within analysis area, but surveys did not document this species.
Moss Bell-heather *Harrimanella hypnoides*	Snowbank communities, wet seeps, ledges, and crevices in alpine habitats.	NO	NO	NO	No Alpine habitat in Project Area.

SPECIES WITH POTENTIAL VIABILITY CONCERNS					
Species	**Habitat Requirements**	**Sightings Present or Historical within the Project Area**	**Suitable Habitat within the Project Area?**	**Project May Impact Species or Habitat?**	**Rationale**
Alpine Azalea *Loiseleuria procumbens*	Exposed dry-mesic heath alpine areas including alpine heath snowbank and the Diapensia-azalea-rosebay dwarf shrubland communities.	NO	NO	NO	No Alpine habitat in Project Area.
Northern Woodrush *Luzlua confusa*	In WMNF, appears to be limited to wet ravine alpine and subalpine communities.	NO	NO	NO	No Alpine habitat in Project Area.
Smooth Sandwort *Minuarta glabra*	Species prefers rocky summits and outcrops up to 3000 ft in elevation. When found in forested habitat, it is in openings created by rocky ledges.	NO	NO	NO	North and South Baldface not in Project area. No rocky outcrops or ledges within Project Area.
Prairie Goldenrod *Oligoneuron album*	Occurs primarily on dry, calcareous cliffs and ledges. May also occur in open fields and roadsides. All known NH occurrences are on calcareous soil or bedrock.	NO	NO	NO	North and South Baldface not calcareous; no calcareous areas or bedrock in project area.
Mountain Sorrel *Oxyria digyna*	Moist, rocky slopes and ledges; alpine streamsides and ravines; snowbanks and headwalls. Above 3500' in northern New England.	NO	NO	NO	No Alpine habitat in Project Area.
Alpine Timothy *Pheleum alpinum*	In NH, uses wet meadows, wet ravines, and damp shores in the alpine zone.	NO	NO	NO	No Alpine habitat in Project Area.
Jack Pine *Pinus banksiana*	Rocky summits, rock outcrops and ledges; favors well-drained loamy sands but is more often found on dry, gravelly or sandy sites. In WMNF, occurs from 2200-4000' elevation.	NO	NO	NO	Project area below 2200'.
Alpine Meadow Grass *Poa arctica ssp. arctica*	In NH, uses nutrient poor soils in alpine/subalpine dry-mesic heath and meadow communities.	NO	NO	NO	North and South Baldface in Analysis area but not in Project area

SPECIES WITH POTENTIAL VIABILITY CONCERNS					
Species	**Habitat Requirements**	**Sightings Present or Historical within the Project Area**	**Suitable Habitat within the Project Area?**	**Project May Impact Species or Habitat?**	**Rationale**
Douglas knotweed *Polygonum douglasii*	Prefers exposed rocky slopes and hillside ledges in well-drained soil where little other vegetation grows. Can also grow in nutrient-enriched hardwood forests.	NO	NO	NO	North and South Baldface not in Project area. Small enriched sites are present in the Project Area but have thick vegetation.
Viviparous Knotweed *Polygonum viviparum*	Wet, mossy rocks, cool or damp slopes, gravels, and seeps in alpine and subalpine areas.	NO	NO	NO	No Alpine habitat in Project Area.
Algae-like Pondweed *Potamogeton confervoides*	Occurs in strongly acidic soft-water bogs, lakes and ponds at a variety of elevations. Also found in slow-flowing acidic streams. Likes muddy shores with lots of vegetation; typically found at depths of less than 15', though water can be deeper. Not known to occur in beaver ponds.	NO	SUSPECT	NO	Boreal acidic-fen may provide suitable habitat but no harvest areas are proposed near it. No slow moving streams or ponds in project area.
Lapland Rosebay *Rhododendron lapponicum*	Strongly associated with dry-mesic heath communities in the alpine. Tolerant of dessication; occurs on well-drained, thin, acidic, gravel-stoney soils. Does not grow on rock outcrops.	NO	NO	NO	No Alpine habitat in Project Area.
Silverleaf Willow *Salix argyrocarpa*	Moist soils in alpine or subalpine streamside and ravine. Known in Tuck's Ravine, Lakes of the Clouds, Ammo Ravine	NO	NO	NO	No Alpine habitat in Project Area.
Dwarf Willow *Salix herbacea*	Snowbank/wet ravine alpine system. In NH, typically occurs in cool, wet ravines, snowbank communities, and along alpine brooks. Grassy, sandy, or rocky places in alpine areas; often on thinner soils than other snowbank/wet ravine species.	NO	NO	NO	No Alpine habitat in Project Area.

SPECIES WITH POTENTIAL VIABILITY CONCERNS					
Species	**Habitat Requirements**	**Sightings Present or Historical within the Project Area**	**Suitable Habitat within the Project Area?**	**Project May Impact Species or Habitat?**	**Rationale**
Satin Willow *Salix pellita*	Wetland obligate. Uses river or stream banks, floodplain forest/moist thickets, forested swamps and lake or pond shores.	NO	SUSPECT	*NO*	Gracie's meadow may provide suitable habitat but no harvest areas are proposed in Gracie's meadow. Harvest in Unit 17 not near Slippery Brook..
Three-leaved Black Snake Root *Sanicula trifoliata*	Limy deciduous woods below 1500'. Most occurrences on steep slopes. Appears to associate w/ dense lush ground cover and relatively closed canopy but has been found near clearcuts and cliffs which may indicate it takes advantage of sunny conditions.	NO	NO	NO	Soils not of limestone in project area. No steep slopes, cliffs or recent clearcuts. Ice storm resulted in thick brush in some units, but canopy relatively open.
Alpine Brook Saxifrage *Saxifraga rivularis*	Alpine ravines, wet and mossy areas, wet cliffs, and some dry-mesic heath alpine/subalpine communities. May benefit from reduced competition associated with moderate disturbance. May be a nitrophile.	NO	NO	NO	No Alpine habitat in Project Area.
Arizona cinquefoil *Sibbaldia procumens*	Snowbank/wet meadow/streamside alpine communities; only occurrence is at bottom of a snowfield in Tuckerman's.	NO	NO	NO	No Alpine habitat in Project Area.
Rock Goldenrod *Soldago calcicola*	Moist rich woods, rocky or gravelly thickets, talus and cliffs.	NO	SUSPECT	Possibly	North and South Baldface not in Project area. Small areas of rich woods present.
Alpine Meadow-sweet *Spirea septentrionalis*	Cool wet ravine alpine and subalpine habitats.	NO	NO	NO	No Alpine habitat in Project Area.

SPECIES WITH POTENTIAL VIABILITY CONCERNS					
Species	**Habitat Requirements**	**Sightings Present or Historical within the Project Area**	**Suitable Habitat within the Project Area?**	**Project May Impact Species or Habitat?**	**Rationale**
Ciliated Aster *Symphyotrichum ciliolatum*	Open woods and dry to moist thickets, shores, and clearings; occurs in openings in pine barrens and dry northern hardwood and red spruce-hardwood forest, and likes clearings and roadsides. Prefers scattered small or large openings in the forest canopy, but not necessarily early-successional forest habitat. Uses soils and sometimes rocky sites.,	NO	SUSPECT	Possibly	Northern hardwood forest present along with roadsides.
Narrow False Oats *Trisetum spicatum*	Open, relatively exposed habitats; often associated with rock ledges, crevices, and waterfalls. Dry-mesic heath and snowbank/wet ravine alpine/subalpine communities.	NO	NO	NO	No Alpine habitat, rock ledges,crevices or waterfalls in Project Area.
Northeastern bladderwort *Utricularia resupinata*	Pond, lake and bog shores and margins as well as some wet ditches. Prefers clear, acidic waters with sandy, muddy, or peaty shores. May require low water levels to bloom, and needs a slightly higher than average water temperature.	NO	SUSPECT	NO	Boreal acidic-fen may provide suitable habitat but no harvest proposed near this.
Mountain hairgrass *Vahlodea atropurpurea*	In northern New England, is limited to the alpine/subalpine zone, especially herbaceous snowbanks communites.	NO	NO	NO	No Alpine habitat in Project Area.

APPENDIX B – List of Scoping Comments and Responses

Each comment received during the December and January 2004 scoping period was reviewed to identify site-specific issues and concerns. Each comment listed includes a response and where supporting information can be located in the EA.

We appreciate the time all respondents spent reviewing and commenting on the Chandler Round Project Scoping Letter. Thank you for your thoughtful comments.

Where possible in the following discussions, the respondent is quoted. For brevity, many comments are summarized. All correspondence is filed and available for public review in the Chandler Round Project Planning Record located at the Saco Ranger Station in Conway, New Hampshire.

Comments and responses are grouped by category:

1. Recreation
2. Vegetation
3. Water
4. Wildlife
5. Heritage Resources
6. Roads
7. Socio-economic
8. Soils
9. Other Issues resolved at a higher level

Recreation

Comment: ***Buffer zones along trails should maintain the integrity of these trails and minimize evidence of harvest activities (***Fred Levigne)

Response: Slippery Brook trail is located on an intermittent section of forest road (NFSR 17), which is a permanent road. Pre-haul maintenance and use of this road, and harvest treatments are potential effects to recreation users on Slippery Brook Trail. This road would be returned to its existing condition following close-out.

Visitor use on Slippery Brook Trail is low during summer and fall. The primary winter use is on the dasignated snowmobile trail. Winter use outside of snowmobile corridors is very low. Where removal of

trees is proposed near Slippery Brook Trail (units 6, 8, 9, 10), skid trail location and marking density would take into consideration effects on foreground views. In partial cut prescriptions, residual tree densities would be such that resultant views would resemble a more open forest condition. Under alternative 2, one clearcut (unit 9) includes a fifty foot buffer to soften visual effects.

Under all action alternatives, logging slash removal is required in these four units for a distance of fifty feet from the trail. Subsequent winter snow would obscure evidence of ground disturbance during winter . In summer, skid trails may be evident for a period of years. Where possible, logs would be skidded away from Slippery Brook trail. Following treatment, regrowth of herbaceous and woody species would further reduce evidence of harvest activities.

Alternatives 3 and 4 address this concern by limiting or eliminating harvest in some of the units along this trail (See EA section 3.5, Recreation Affected environment, section 3.5.1 Direct and Indirect Effects - hiking trails, and Appendix D, mitigations).

Comment: ***How would the proposed project affect the soil, water, plant, and animal resources of Mountain Pond Research Natural Area (NRA)? Would the project affect the study goals expected of the NRA? What changes in monitoring and evaluation of the NRA would occur following this project.*** (The Wilderness Society)

Response: The Research Natural Area is separated from units 1 and 2 by a distance of over 400 feet. No drainage features would move water toward the RNA. No other changed conditions resulting from the treatment of units 1 or 2 would affect the research natural area. The RNA is on the other side of the ridge from unit one, and is around the side of a gentle rounded ridge from unit 2, thereby facing south. Unit 2 faces east. Slopes in the area average 15%. No evidence of intermittent streams was found within the NRA near HMU 505, or in the untreated area between the NRA and units 1 or 2. Therefore, the determination is made that the proposed treatments and road uses would not change any feature of the NRA, and would not change the monitoring and evaluation of the NRA, and that no measurable effects would likely occur as a result of this action. Since this issue is mitigated with project design, it is not discussed further in the EA.

Comment: ***Can you prevent illegal use on the roads (***Pierce Beij)

Response: Visitor use in the area is currently very low. There is little evidence of use west of Slippery Brook except immediately adjacent to the existing crossing where the temporary bridge is proposed. Illegal road use is not expected to increase following this project because temporary bridges would be removed and opened roads restored to their closed condition. Some limited amount of illegal snowmobile use occurs.

Mitigations for roads include "Following harvest activities, culverts would be removed and road surfaces waterbarred, and roads returned to their closed condition" (see Appendix D, Roads). The Proposed Action (Chapter 1), and Alternative descriptions in Chapter 2 itemize for each action alternative "Seed and close all opened roads to vehicular traffic when the project is complete. All opened roads shall be returned to closed intermittent status".

Opening existing roads proposed for use may result in a very small increase in overall use, until brush and regenerating trees discourage these uses. Estimates are that any new use would be limited and temporary, and would have no affect on any resources in the analysis area.

Comment: ***"We would like to see units 12-22 and 25 dropped from the sale because they lie in the southern portion of the Friends of Wild River wilderness proposal." (***The Wilderness Society", Appalachian Mountain Club,)

Response: The 2004 Roadless Area Inventory – Wild River Roadless Area (Forest Plan Revision) includes a portion of unit 9, and encompasses units 11, 26, 28, and 29. The acres of various treatments for these units are shown in tables in Chapter 3, section 3.1, and discussed in the narrative. Section 3.1 discusses at length

the effects of the alternatives on Wild River Roadless Area, the criteria used to meet roadless and Wilderness criteria, and cumulative effects of the project alternatives on the Wild River Roadless Area. The project alternatives would not eliminate any area from consideration as Roadless and would not effect the degree of disturbance of solitude or any area for potential Wilderness.

Comment: ***"Many of the northern portions of the proposed action are within the Wild River Wilderness proposal made by the Friends of the Wild River, of which I am a member. It is particularly important that these lands approximate the natural condition of the forest. Clear cuts and group selection cuts that clear an areas or areas that are significantly larter in total area than that generated by natural disturbance should be avoided. I feel that at most single tree selection is appropriate in these areas".*** Regarding the treatments for units 11-22, 25, 26 and 28***, "My understanding is that the proposed action is not large enough or intensive enough to preclude the area from Wilderness consideration, and I appreciate that." (***Tom Van Vechten)

Response: The 2004 Roadless Area Inventory – Wild River Roadless Area (Forest Plan Revision) includes a portion of unit 9, and all of units 11, 26, 28, and 29. The 2004 Roadless Area Inventory – Wild River Roadless Area is shown on Figure 3 of the EA. Effects to the Wild River Roadless Area are provided in section 3.1.1, Direct and Indirect Effects on Roadless and Wilderness character. That section states "Alternative 2 proposes the largest acreage of clearcuts within the 2004 Roadless Area Inventory – Wild River Roadless Area, at 55 acres, with none for Alternative 3, and 12 acres for Alternative 4. This adds 0.07 percent of the Roadless Area into regeneration condition for alternative 2, none for alternative 3, and 0.017 percent for alternative 4." In addition to the clearcuts stated above, Alternative 2 proposes an additional fifty acres of group selection and single tree selection treatments within the WRRA, Alternative 3 proposes no additional treatments within the WRRA, and Alternative 4 proposes 79 acres of group selection and single tree selection treatments within the WRRA.

The treatments in the proposed action, alternative 2, meet wildlife and silvicultural objectives stated in the Purpose for the Action, and Need for Change sections of Chapter 1. Direct Effects, and Cumulative Effects to wildlife, (Wildlife 3.7), and to vegetation (section 3.12) explain the consequences of No Action, and of the proposed treatments under the Alternatives.

Vegetation

Comment: ***Whole tree harvesting and clearcutting could reduce soil nutrients, organic material, and combined with acid precipitation could have a cumulative effect on soils. (***Pierce Beij, other general comments, and Forest Service internal concern)

Response: Whole tree harvesting means removing the whole tree to the landing where tree branches are chipped and removed as a forest product rather than being left at the stump. No whole tree harvesting is planned for this project. The potential effects of clearcutting on soil nutrients, and effects of acid precipitation are discussed at length in Chapter 3, Soils. (see Appendix D and section 3.4.1 – Soil Erosion)

Comment: ***Does the abundance of new browse resulting from the 1998 ice storm count as early successional habitat under the Forest Plan? And i****s there lack or abundance of natural and created openings providing moose habitat and browse? (*Forest Service- internal concern)

Response: Wind storms and other natural disturbances alter existing conditions in forests. Disturbances are beneficial in many instances, and yet may compel forest managers to adjust existing management plans or initiate new plans depending on the resources and values involved.

A large amount of damage to tree crowns occurred in many of the hardwood stands in the analysis area from the ice storm of 1998. Eighty to ninety percent of the trees survived and have sprouted new branches. In addition, of those that survived, a high percentage were severely damaged and remain susceptible to insect and disease.

Where tree crowns are moderately to heavily damaged, additional sunlight has been able to reach the forest floor. Understory beech and other shade tolerant species are able to capitalize on this increased sunlight. Beech in particular is in a position to take advantage of new sunlight in many stands because it was present as advanced regeneration prior to the disturbance. Unless some of the beech is removed during harvest treatments, other desirable species may be crowded out.

Availability of browse above normal levels within these stands is evident. However, the primary understory species present at the time of the ice storm (beech), is not a desirable browse species. Although ice storm damage areas experienced a flush of woody growth in the understory, it in no way resembles the kind of dense young woody vegetation and herbaceous growth sought in early successional habitat. In addition, an important reason to create early successional habit is for birds. The combination of opening size and structure are factors that make openings important to these birds and other species. The amount of browse present is important to a number of other species including large ungulates such as deer and moose, and showshoe hare. The ice storm did not result in any 'early successional habitat' from the context of large opening size with brushy structure. A lack of early successional openings is reported in Wildlife sections 3.7.2 and in the Alternative Effects section 3.7.3).

Comment: ***The proposed action does not propose enough clearcutting to meet the goals of the Forest Plan (***Robert Richardson***)***

Response: Forest Plan goals include managing habitat for wildlife species by providing the necessary habitat diversity to maintain viable populations of existing native and non-native vertibrate species. However, controversy over harvesting on the National Forest has resulted in Decisions which included fewer acres of clearcutting than was suggested in Forest Plan projections.

The desired amount of early successional habitat described in the Purpose and Need for this HMU is up to 569 acres, but the Forest Plan does ot require this amount. Management Area 3.1 allows for and encourages uneven-aged management. About half of the units are uneven-aged harvest, where early successional goals are not applicable. However, up to 200 acres of clearcuts (in the proposed action) added to up to 579 acres of group selection treatments that allow up to 30% of the unit in small group openings, the proposed action begins to resemble the desired condition for wildlife habitat envisioned in the Forest Plan. Refer to the Wildlife section 3.7, for analysis of the effects of the proposed alternatives, including creation of early-successional stands.

The Purpose and Need statement for this project is a direct result of current conditions compared to the desired conditions of the Forest Plan. The alternatives (including No Action) respond to resource concerns and public issues that effect the ability of a given project to meet the land stewardship goals for that area. The Deciding Official must choose an alternative and provide supporting rational for the decision. The EA provides the Decision Officer a range of alternatives from which to select.

Comment: ***Use weed-free native seed for landings, temporary roads and skid road erosion control efforts to prevent introduction of non-native species (***Pierce Beij***)***

Response: All erosion control seeding in use by the Forest Service, and in timber sale contracts administered by the Forest Service require use of weed-free native seed. Erosion control seeding with native seed mixes is often necessary on landings and on steeper sections of skid roads. The contract seed now used includes only winter rye and is applied only where erosion potential exists. Areas with low erosion potential are allowed to re-vegetate naturally. (see Appendix D)

Comment: ***Sensitive plant populations and unique sites need to be avoided (The Wilderness Society)***

Response: All known sensitive plant populations, and any sites identified during layout or sale administration would be avoided. Unique sites identified by the New Hampshire Natural Heritage Bureau

(NHNHB) are not in or affected by the proposed action. Additional Surveys are planned prior to implementation.

Comment: "***We do not believe that clearcutting should be a silvicultural practice on the National Forest. The stands proposed for clearcutting should instead be proposed for harvest using methods that would better mimic natural disturbances E.g., single-tree selection or group selection."*** (The Wilderness Society)

Response: We considered an alternative that would use only uneven-aged management techniques, but it was eliminated from analysis because it did not meet the Purpose and Need for this project (EA Chapter 2, Section C). Clearcut acres vary between alternatives. Clearcutting remains a legitimate silvicultural practice used to achieve desired conditions as described in the Forest Plan.

Comment: "***Proposed and past harvests are cumulatively eliminating old trees and old forest conditions in lower elevations in this HMU***" (Pierce Beij)

Response: MA 6.1 lands provide over-mature trees and habitat conditions. Forest-wide, there are approximately 33,000 softwood acres and 60,000 hardwood-capable acres (based on ELTs) at lower elevations in MAs other than 2.1 and 3.1. The history of harvesting in the late 1800s and early 1900s dictates that much of this area averages 80-100 years old now. This is comparable to the age of stands in 3.1 lands. Ultimately, low elevation stands in Management areas without harvest will become "old growth". Rocky or inaccessible areas, and especially wet low-lying areas in this HMU are not proposed for management. These and similar areas in adjacent HMUs are also unlikely to be managed in the future, and would become old forest. Nearby Mountain Pond Natural Research Area and lands proposed for designation in the Shingle Pond area, are examples of set aside areas for which older forests will exist indefinitely. This issue is not discussed further in the EA.

Comment: "***What are the percent of existing stands in mature age classes and intermediate age classes? This information needs to be detailed not just at the HMU level, but also at the Forest and regional (NFS land and private land) level." (The Wilderness Society)***

Response: The Wildlife section (Section 3.7) of the EA provides detailed information for HMU 505 regarding forest types and age classes. An unpublished 'habitat trend analysis report' for the White Mountain National Forest was prepared in 2003 (see Project Record). Sources of information for this forest-wide habitat trend analysis include USFS 1993, 1994, and 1996 monitoring reports and queries from the White Mountain National Forest CDS database in 2003.

Forest Plan direction is based on management of habitat and wildlife on a HMU basis. The cumulative effects analysis for wildlife, is based on forest-wide Forest Plan monitoring data, forest-wide MIS reports, and regional and Forest trend data. Within HMU 505, less than 1 percent of the land is classified as less than ten years old (early successional). EA section 3.7.3.1 under the No Action Alternative indicates that mature and overmature stands comprise 3,758 acres of the 3.1 lands in the HMU. Young stands add to 900 acres. Management 6.1 lands (2,788 acres) are considered to be mature. This equates to 88 percent of the HMU in mature and overmature condition (60+ years) and 12 percent in young condition (10-59 years) (See section 3.7.3.1 through to 3.7.3.4).

Comment: "*Please describe the methodology that was used in field reconnaissance. How recently have compartment and stand records been updated and compared to actual conditions on the ground. Stand conditions on the ground form the backbone of any analysis. If the site conditions are not in actuality, as they appear in the records, the analysis will be flawed from the beginning." (*The Wilderness Society)

Response: The EA does not specifically address these public issues, however, the following steps were used in the design of proposed harvest units and access needs for Chandler Round Project:

1) Reviewed existing conditions of previously identified stands. These stands were identified from Compartment records as potential for treatment based on condition, age and history. Field reconnaissance verified stand conditions, and documented the Need for Change.
2) Stands proposed for treatment within HMU 505 meet the following criteria: a) basal area of the stand are greater than 120 for softwoods and 100 for hardwoods, or; b) stands had severe ice damage from the 1998 storm; and c) the terrain is suitable for ground based timber operations; and d) the stands are in management area 3.1, and; e) all stands are well over 50 years old.
3) Wildlife, recreation, water, soil, silviculture, visuals, fisheries and transportation specialists visited the stands, roads and other pertinent locations needed to analyze the project proposal, and to observe existing conditions, from which to make project design recommendations.

Water

Comment: ***Buffer zones along streams should maintain the integrity of these streams to minimize water quality impacts. (***Forest Service - internal concern***)***

Response: Project design and mitigation measures identified for this project would minimize potential effects to water quality and quantity. These mitigations place restrictions on treatments in riparian areas, including a ten foot no-cut buffer on perennial brooks adjacent to Units 12, 20, and 8, and maintenance of canopy cover and basal area guides within these riparian areas. Portions of stands in partial cut Units 8, 9, 12, 13, 14, 15, 18, 19, and 20, border small brooks or intermittent tributaries and would receive these riparian area mitigations.

Mitigations in riparian areas allow for removal of no more than 50% of the existing basal area. Additional mitigations and Contract requirements such as prohibiting skidding equipment in riparian areas except at designated crossings, designating skid trail locations, etc, are also itemized in Appendix D. These buffer widths have proven to be effective on past harvest treatments.

The Soils section of Chapter 3 states "Partial removal of the vegetation canopy does not normally cause a measurable increase in runoff, or erosion that would affect water quality. There is little change (no measurable increase) in the amount of runoff leaving most partial cut units. The effectiveness of the remaining canopy to intercept rain and snow, and the forest floor to absorb runoff, remains fairly constant. This is especially true as the residual trees re-occupy the canopy, natural regeneration and growth of shade tolerant understory trees and herbaceous plants reestablish, and grass, tree and shrub species establish on skid roads." Specific direct, indirect and cumulative effects from this proposed action are documented in detail under 'Water' and 'Soil' in Chapter 3. Given the silvicultural prescriptions, the riparian buffer widths, and other resource mitigations, the integrity of these riparian areas is expected to remain intact.

Comment: ***The large size clearcuts would negatively impact the contiguous brooks with increased runoff. (VanVetchen) "Direct and indirect effects from erosion and sediments due to expected timbering activities must be acknowledged and appropriate mitigation measures proposed. Discussions must insure that these Class A surface waters must be protected." (***Conservation Law Foundation***)***

Response: see section 3.3, Water, where direct, indirect and cumulative effects are discussed. This section shows that project design mitigations and proper implementation would not result in effects outside of those anticipated in the Forest Plan, or effects beyond those allowed for 'outstanding resource waters' of the state of New Hampshire. Mitigations are listed in Appendix D.

Where treatment of trees near streams is proposed, skid roads and marking density would consider the possible effects to streamcourse stability and water quality. Main skid roads are located wherever possible outside of these riparian areas. Tree felling is directed away from riparian channels. Additionally, the Forest Plan advises recruitment and retention of trees 18 inches DBH and greater within these riparian buffer areas.

Comment: ***Clearcutting, road restoration, bridge construction and other harvesting may affect water quality and quantity. The project should minimize water quality impacts of stream ecosystems. (***Forest Service - internal concern***)***

Response: In addition to project design and effects discussion above regarding water quality, standard mitigation measures (Best Management Practices) would be employed to minimize impacts to water quality that might result from the proposed temporary bridge placement and road restoration maintenance. Proposed design improvements such as adding drainage ditches on Forest Roads or adding surface rock in spots where needed may improve the resistance of these roads to erosion. (see section 3.3 Water; section 3.9 Fisheries, and Appendix D, Mitigations)

Comment: ***Sedimentation or reduced water quality resulting from the proposed road and bridge activities may affect the wild trout fishery***. *(*Robert Stone*)*

Response: The above discussion regarding water quality, includes components important to fisheries. Water temperatures are maintained with the canopy cover requirements. Other standard mitigation measures are employed to minimize impacts to water quality and fisheries that might result from the temporary bridge placements or from road maintenance, and are listed in Appendix D. (see also Section 3.9)

Wildlife

Comment: ***The EA needs to examine the biological values and environmental effects of leaving overmature trees un-harvested. What definition of 'overmature' is used***? (The Wilderness Society)

Response: Many overmature trees would remain un-harvested in areas receiving single tree selection treatment. Trees with extensive decay, trees with obvious cavities, and trees, which 'sound' hollow, are left uncut. Extensive discussions in the EIS for the Forest Plan, and in the EA, discuss the wildlife strategy for hardwood, mixedwood, and softwood stands. The strategy is designed to provide a variety of habitat types, species and structure for a diverse range of wildlife species (see section 3.7 Wildlife in the EA). Discussions include the effects of No Action.

Overmature is defined differently depending on the forest type. This project includes the following community types with their representative overmature age classification shown in parentheses: paper birch (80 years); northern hardwoods (120 years); and spruce-fir (90 years). Even though a stand is classified as a mature stand, or as a overmature stand, there are often individuals represented on every acre of the stand that are older or younger than that lable. (Biologist – personal communication)

Comment: ***Summer and fall logging may displace nesting birds and cause trunk damage to residual trees*** (Fred Levigne).

Response: Winter logging is less impacting on natural resources despite other effects such as impacts on winter uses on Slippery Brook Road. Summer or fall logging are considered where resource effects are

determined to be acceptable or desirable. In some cases, summer logging may be desirable, such as when scarification of surface soil (duff) layers from skidding activities is beneficial. Scarification of soils fosters the establishment of sugar maple seedlings, which germinate and survive when in contact with mineral soil. Soil scarification provides sugar maple seedlings an opportunity to establish in regenerating young stands over competing beech and other hardwood species which are better established on many of the sites. However, resource impacts to soils and residual stand damage are primary considerations. These considerations often limit summer harvesting to areas with non-susceptible soils and to harvest prescriptions (clearcut) where residual stand damage is not a factor. (EA section 3.4 – soils, and personal communication – planner)

Regarding the season of harvest, the type of equipment used, harvest method, and operator skill influence the effects to the residual stand and soils. Contract administration includes frequent contacts with the logger, designated skid trails, and other contractual requirements that limit the amount of soil that is disturbed and damage to the residual stand. Winter logging reduces damage to root systems and soil disturbance on main skid trails, and is required on several of the units. Winter or fall/winter logging is required in some units to minimize the impacts to recreation and to minimize the likilhood of bark slippage during skidding. See the EA Soils report for more information on soil effects. Reference Appendix D for a list of harvest requirements and mitigation measures designed to minimize impacts to forest resources and to the residual stand. Summer harvest is often allowed in clearcuts where residual stand damage is not a concern. This project allows summer logging in some of the more open partial cut units because of the open nature of the existing stand within those units (personal communication – silviculturist).

Comment: "***The affected environment includes more than just the HMU itself and the analysis of the effects must look beyond the confines of the HMU boundaries."*** (The Wilderness Society)

Response: The Affected Environment may vary by resource (i.e. vegetation, soils, water, wildlife, fisheries, etc.), and the Analysis Area used to determine effects on the resource would vary accordingly. For some resources, the cumulative effects Analysis Area may be defined by HMU boundaries (i.e. vegetation, wildlife); and for others it may defined by some other feature (i.e. watershed boundaries for water; project area for soil). The Affected Environment portion of each resource section provides rationale for the size and extent of the cumulative effects analysis area used. (see definition of Analysis Area for each Resource, EA Chapter 3).

Comment: ***"I continue to fully support responsible sustainable yield timber harvest operations on the WMNF. The vast majority of visitors to the WMNF enjoy either seeing or hunting wildlife. Improved wildlife habitat is a win-win situation for the people and for the wildlife. I would like to see the Forest Service implement the 'Forest Plan' to the full scope of its prescription, especially regarding clearcut openings to promote browse. Your proposed action falls 348 acres short of Forest Plan goals that would result in even stronger, healthier and more vigorous deer, moose, partridge, rabbit, and birds"***. (Bob Richardson)

Response: Comment noted.

Comment: "***What predators do you expect will take advantage of the increased access to the area that the creation of early successional habitat will provide? What species will be affected by increased access? What other early successional habitat exists in and around the area?***" (The Wilderness Society)

Response: Early successional habitat provides new growth that supports increased local use by species such as snowshoe hare, mice, some songbirds (e.g. chestnut-sided warbler and mourning warbler) and many insects. "Predators" come in many shapes and sizes. For example, many bat species (including TES species) will forage for insects in openings; raptors will take advantage of openings to capture songbirds and

mice; carnivores such as marten, coyote, bobcat, and lynx will hunt along openings for snowshoe hare and mice. All of these species are indigenous members of these communities. As a part of Forest Plan Revision, a Species Viability Evaluation was completed to determine which species might be at risk for loss of viability on the WMNF. No early-successional species are on this list, therefore, predation is not expected to cause negative impacts to any species utilizing early-successional habitats.

The wildlife habitat strategy developed for the White Mountain National Forest is based on research that indicated that a diversity of forest types and age classes is needed to provide the habitat needs of the full array of wildlife species inhabiting the White Mountain National Forest (DeGraaf and Rudis 1986, DeGraaf et al. 1992). These publications provide information on the type of habitats used by wildlife species that occur on the White Mountain National Forest. (See Appendix F)

Section 3.7 analyzes the direct and cumulative effects of the proposed action on wildlife and habitats in the Analysis Area. Analysis indicates that there are 58 acres of existing early successional habitat from past management activities in the HMU. Effects from recent or past activities on private lands are limited to the extent of private lands, which are not in, but are adjacent to the HMU. Private lands equate to eight percent of the McDonough brook cumulative effects area, and there are none in the Slippery Brook watershed Therefore, the potential of current or future actions on private land (early successional habitat creation or other deforestation) having a cumulative effect is very low, and is also far removed from much of the HMU. The EA discloses the anticipated benefits to wildlife species and wildlife habitat resulting from the proposed action.

Management Indicator Species (MIS) are defined for the various habitats on the Forest to assess effects of management activities on their populations. An evaluation of these species showed that most were stable or increasing in population levels and habitat. The only exception appears to be species associated with early-successional habitats (USFS 2000, 2001a).

Comment: "***What are the results of your monitoring, evaluation and survey for avian, TES and RFSS species, MIS, goshawks, Indiana bats, Canada Lynx, wildlife and small whorled pogonia in and around the Project Area?"*** (The Wilderness Society)

Response: Monitoring guidelines for wildlife are defined in the Forest Plan (Forest Plan Chapter IV-12). Monitoring of the various Management Indicator Species occurs at forest-wide or region-wide levels (USFS 2001a). Monitoring efforts for TES and RFSS species in the Project Area are described in the BE (Project Planning Record). The results of monitoring efforts for MIS, TES, and RFSS species on the White Mountain National Forest are described in the annual forest monitoring reports (USFS 1993, 1994, 1995, 1996, 1998, 1999, 2000). These are summarized as appropriate in section 3.7, and section 3.8.

Comment: ***What is the effect continued harvest would have on fragmentation of interior forest in this HMU? (***Pierce Beij***)***

Response: See section 3.7.3, Wildlife Effects, for a discussion on fragmentation which includes the following quotes "Research has found no evidence of negative effects of forest fragmentation exhibited in isolated forest environments in these large forested areas, even with active timber harvesting (Askins et al. 1990, Askins 1993, DeGraaf and Healy 1988, Thompson et al. 1992)", and "In addition, brown-headed cowbird, a species associated with deforestation and forest fragmentation, has not been observed in the interior of the WMNF, indicating fragmentation does not exist (Yamasaki et.al. 2000)."

Comment: ***Removal of ice damaged trees for timber should not be a project objective when the dead and dying trees provide a necessary habitat function in a generally young forest.*** ***(***summarized from several comments***)***

Response: The White Mountain National Forest Plan sets guidelines for management areas, and strategies for managing resources within these areas. The proposed action is based on Forest Plan direction. While this project treats stands that were ice damaged, that was not the purpose for the proposal. However, the presence of ice damaged trees and their contribution to the diversity of, or their detraction from the health and vigor of individual trees and stands is a consideration in the context of applying Forest Plan Management direction to these HMU management areas. While perhaps not directly discussed in the EA, this comment is recognized by the planning team, and is integrated into project design, mitigations, marking guides, and the wildlife and vegetation analysis provided in section 3.7 and 3.8.

Heritage Resources

Comment: "Please describe the survey methodology that was used to search for both historic and prehistoric resources in the project area. (The Wilderness Society)

Response: The following steps were followed to survey for cultural resources within the Project Area:

1) Research was conducted prior to field review to identify cultural resources sites within the area. The cultural resource paraprofessional consulted District cultural resource maps, atlases, and files, and additional historic documents
2) The cultural resource paraprofessional conducted a thorough walk-through of each unit in the proposal with particular attention to areas near streams, on benches or other flat areas, rock outcroppings and ledges.
3) The Forest Archeologist reviewed the cultural resource report.
4) The State Historic Preservation Officer (SHPO) reviewed the cultural resource report and provided concurrence on January 27, 2003.

In addition, if any site or artifact were discovered during marking, they would be identified and protected. The Sale Administrator would ensure that skid trails and felling/skidding operations not interfere with any of these sites. If during logging, unknown sites or artifacts are uncovered, harvesting would be halted until the Forest archaeologist or district paraprofessional could evaluate the findings and make recommendations on how to proceed. Timber sale contract provisions address protection to heritage sites.

Roads

Comment: "***Increased logging truck and heavy equipment traffic on Town Hall and Slippery Brook roads will negatively impact public safety, disturb wildlife, and require increased maintenance of said roads***." (Robert Stone)

Response: This concern is related to the safety of forest users on this Road. Logging operations would follow all federal, state and contractual requirements to insure the safety of other forest users and travelers on Town Hall Road. The sale contract requires safety signs on all Forest Roads and trails where activities are occurring. Log truck drivers are required to maintain safe speeds, follow posted speed limits, and meet all contractual requirements. Violations can result in contract shut downs (see Appendix D Mitigations).

Regarding increased maintenance of roads, these costs were factored into the socio-economics analysis (section 3.6) of the EA. Town Hall road and Slippery Brook road have been used periodically for three decades. Timber haul records from 1975 to 1986 indicate the annual volume hauled on Town Hall road was 1.8 million board feet. Since the signing of the 1986 Forest Plan, haul averaged 0.9 million board feet up to 1996. No timber was hauled from 1996 to 1998. Kearsarge project was estimated to haul 1.4 million board feet per year, and Chandler Round is estimated to haul approximately the same.

Comment: ***How does this project fit into the overall road system needs and plans on the Forest? What are the long–term funding opportunities and obligations for completing the roads work detailed***? (The Wilderness Society)

Response: All roads needed for harvesting within the Project Area were inspected on the ground by Forest Service road engineers and resource specialists. A complete Roads Analysis (see project record) was prepared for this analysis area prior to project design. Roads were analyzed to evaluate soil stability, past erosion problems, drainage needs and additional engineering work required to bring the roads up to Forest Service standards that these roads were designed at. There are 0.3 miles of new road construction associated with this sale. The need and location for this road was thoroughly analyzed during project planning. All other roads are existing roads needing pre-haul restoration maintenance which would be completed by the purchaser. Costs for road work required for this project would be deducted from the total sale value. Section 3.6 lists the road costs associated with each alternative. Once the project is completed, road improvements (culverts and closure barriers) would be replaced and these roads would be closed to vehicle use. Future maintenance on these roads will be deferred until they are needed again, and their classification will remain unchanged. Hence, there would be no periodic road maintenance costs carried forward after the sale that are not present currently.

The Roads Analysis prepared for this sale indicates that 0.3 miles of proposed road would be needed for future management of the accessed area. All classified and unclassified roads in the roads analysis area were reviewed. The Forest–wide Roads Analysis recommended declassification of part of a road that accesses 6.1 lands, and another short spur that is not needed near unit 6. That analysis also recommended classifying as a 'system road', an existing unclassified road that was previously constructed and used and again proposed for une to access units 11, 26 and 28 (Forest Road 5049). (see Roads Analysis - project record)

Socio-economic

Comment: "***How many years do you expect the harvest will last? What is the average number of sales and payment units for a project of this size*****?** (The Wilderness Society)

Response: Timber sale contracts are usually three to five years and vary depending on the season of operations. Alternative 2 proposes 25% of the project be harvested in the summer/fall/winter, and 26% requires winter operations. The remainder allows fall/winter logging. Summer/fall and S/F/W harvest shortens the sale completion time since stands can be harvested during more of the year.
The project would likely be divided into two timber sales if alternatives 2 or 4 were selected. If alternative 3 is selected, only one sale is likely.

Comment: "***Please describe any future proposed timber sales and other actions in the area surrounding the proposed project***." (The Wilderness Society)

Comment: ***"Consider relocating the snowmobile trail from the Slippery Brook Road during times of harvest."*** (Paul Grey, Buerau of Trails Chief)

Response: Current and future actions on the Androscoggin Ranger District include 122 potential clearcut acres for Peabody plus the not yet planned Connor Brook Project. On the Saco Ranger District, future potential actions that may occur more than ten years out, include up to 200 acres of treatments in the East Fork of the East Branch of the Saco River watershed, in the west third of HMU 505, but the project would primarily be in HMU 507. Estimates are that less than 40 acres within the Wild River Roadless Area would be included as regeneration cuts. A potential action south of the Project Area that may be considered in the future is an alternate snowmobile trail in lieu of the Switchback trail. A formal proposal has not been made but would receive its own analysis. Any project proposal in the future on National Forest lands would receive its' own public scoping, environmental effects analysis, and documentation. (see Sections 3.1.2 Cumulative Effects on Roadless/Wilderness, and section 3.12, Vegetation)

Comment: "***Possible economic loss to taxpayer's, and market distortion to the detriment of private landowners should be considered."*** (Pierce Beij)

Response: The comment seems to be related to the assumption that this sale may cost more to implement than the value of the wood removed. Chapter 3, section 3.6 responds to the question. This project is expected to have average percentages of pulpwood, and above average diameter and quality sawtimber.

Regarding market distortion, National Forest timber improves market conditions. There has been a recent drop of pulpwood, sawtimber, and chip material for local mills. This decrease in supply has caused prices to rise. National Forest timber is not reducing the value that private timber owners can receive. There is not a glut of wood and wood products in the market, especially regarding high quality sawtimber. There is a high demand for private and public timber sales with quality sawtimber. Demand for high quality sawtimber (as evidenced in current prices), indicates that the local market has room for both private and public timber and that sustained yield provides stability to the market and to employment, and thus communities. This goal has been stated in the current Forest Plan since 1986.

Comment: "***What is the likely economic return to the local communities and the US Treasury? What effects would this timber sale have on the economic returns expected from other recreational uses such as snowmobiling that would be diminished during the two to three years until project completion?*** (The Wilderness Society)

Response: The economic analysis for the project answers these questions and is found in Section 3.6 of the EA. Effects to recreation are discussed in Section 3.5. It is beyond the scope of this project to analyze in detail the broad or regional economic effects. The recreation report shows no measurable effects resulting from this action other than the potential for displaced snowmobiling due to closure of Slippery Brook road. While this is a concern, cumulatively, the local trail system can absorb this temporary loss and the regional (North South trail – Corridor 19) remains accessible from other locations.

Comment: ***Are local companies usually successful on bidding on sales of this size?*** (The Wilderness Society)

Response: Recent sales have been bid on by several NH, Maine and Vermont sawmills. A regional report for the second half of fiscal year 2003 (dated 11/14/2003) showed an average of 6.3 bidders per sale on the WMNF, with average high bid value of $325,059.00, and a total bid value of $2,600,472. (Not discussed further in the EA)

Soils

Comment: "***Whole tree harvesting should not be considered*** (Fred Levigne)

Response: Whole-tree harvesting is not proposed in the Chandler Round Project. (See section 3.4.1, Soil Erosion)

Comment: "***Please provide more detail on the soil types in the Project Area and the specific vegetative conditions they support***." (The Wilderness Society)

Response: The WMNF uses ecological land type (ELT) classification, which includes soils information, to depict vegetative conditions on the National Forest (Section 3.6.1, Soil Erosion, and section 3.12, vegetation). This includes succession trends of changing species proportions and identification of those species that would be predominant in the absence of disturbance, natural or human-caused. This generally corresponds to forest habitat typing done by Bill Leak at the Bartlett Experimental Forest, including documentation since the early 1930s on species and soil relationships.

Comment: "***Describe erosion control measures along road improvements?"*** (The Wilderness Society)

Response: Erosion control measures on existing intermittent roads include re-establishing ditches and drainage structures to avoid concentration of surface water that may lead to stream sedimentation. Stabilization after harvesting may include seeding and mulching at selected locations. The Saco District prefers, and has found that re-invasion of native species is often all that is needed to prevent soil erosion, depending on factors such as steepness of slope, irregularity of terrain, and proximity to streams. Erosion control on existing all-season roads includes mainly grading the road surface to facilitate drainage of surface water and maintenance of ditches and culverts to manage surface water in accord with the original design of the road (see Appendix D, Mitigation Measures, and EA section 3.3 Water, direct and indirect effects).

Other Issues brought forward during public involvement that are resolved at a higher level

This section discusses Other Issues brought forward during public involvement that are resolved at a higher level, as listed under items 1, 2, 3, or 4 in section K of chapter 1.

Comment: ***"The Economics and environmental effects of much longer rotations should be considered?"***

Response: This is a Forest Plan revision issue, and is outside the scope of this environmental analysis

Comment: ***"Hand thinning should be considered in some situations, creating more jobs and lower impact?"*** *(*Pierce Beij))

Response: This is a Forest Plan revision issue, and is outside the scope of this environmental analysis.

Comment: ***"Can the Forest Service guarantee revenue and what has been the return on other recent sales?"*** *(*The Wilderness Society)

Response: See section 3.6, socio-economics for expected revenues from this project, and for bid prices on four recent sales. Returns from other sales on the White Mountain National Forest averaged 6.3 bidders per

sale, with average high bid value of $325,059.00 per sale, and a total bid value of $2,600,472.00, for the second half of fiscal year 2003.

Comment: ***The projects early successional habitat goals are too high, and should be based on natural conditions likely to have existed pre-settlement.***

Response: The wildlife report (Section 3.7) documents the beneficial effects that the action alternatives, including proposed regeneration (clearcut) harvests would have on wildlife species. The Forest Plan provides direction for forest management, and recommends 569 acres for this HMU. The more aggressive alternative (2) only proposes 200 acres of early successional openings. There is no evidence that this project, even cumulatively with other vegetation management projects on the White Mountain National Forest would harm individual wildlife species (MIS), or would detract from their viability, or would suspend the ability of any species or group of species from interacting across its range due to loss of connectivity. There is no Forest Plan direction to mimic pre-settlement conditions. (also see EA section 3.12)

Appendix C

Management Systems and Harvest Methods

Management systems are long-term strategies to regulate inventories and harvest outputs in forest stands. The major systems are even-aged, uneven-aged and two-aged management. Harvest methods are the means used to implement these strategies. They refer to the methods used to foster stand development, including structure, species, and growth rates, and to encourage reproduction in the stand.

Even-aged management consists of growing stands of a single age class for an identified time period, known as a rotation. This mimics the way many species grow naturally. At the end of a rotation a new stand is initiated either by a single removal cut (clearcut) or a series of cuts over a relatively short time (shelterwood or seedtree). Seedtree and shelterwood cuttings involve leaving a scattered layer of mature trees to provide seed or shelter for new regeneration. In the White Mountain National Forest, where seed is usually abundant and most of the hardwood species sprout from the stump when cut, clearcutting is the most efficient evenaged regeneration method. This method is most efficient regarding the short time frame that is required to re-establish a new stand that maximizes utilization of the site in terms of growth or volume production.

Uneven-aged management creates a stand where several different age or size classes occupy the same stand and perhaps the same acre. Each harvest in the stand is a regeneration harvest creating space for new seedlings. It also releases the residual trees from competition, allowing them to increase growth and vigor. Under uneven-age management, the stand is harvested more frequently than with an evenaged system, ususally about every 15 years.

Harvest Method

Harvest method refers to the selection of numbers of trees and species of trees to be removed from a stand, and over a specified time period. The harvest methods (or silvicultural prescriptions) proposed for this sale are listed below.

Clearcutting - In a clearcutting operation the entire stand is cleared so that a (generally) single-aged generation of trees can colonize the site under full sunlight. White Mountain National Forest Plan standards require a quarter to half acre reserve patch for every ten acres clearcut. Following a clearcut harvest, the new stand of trees can originate from any combination of wind-born seed (most species except oak and beech), animal deposited seed (e.g., oaks and beech), seed accumulations in the soil (e.g., pin cherry), re-sprouting from stumps (e.g. many hardwood species, no local conifers) and advanced (pre-existing) regeneration of any species (very common in conifer stands and with shade-tolerant hardwoods). The new generation of trees usually forms a closed-canopy seedling layer in five to seven years. Clearcutting can be used to address growth repression resulting from advancing age, excessive crowding, and disease or disturbance history. Clearcutting is also the primary method for producing early successional wildlife habitat.

Commercial Thinning - Thinning is a silvicultural treatment done in younger stands where the density of trees is greater than needed to utilize the site and often too great to maximize individual tree growth and vigor. The operation consists of harvesting individual trees in a regular pattern throughout the stand. Trees selected for cutting are either surplus to stocking needs or undesirable from the standpoint of species or growth potential. The residual stand is moderately stocked and consists of individual trees with an above-average capacity for growth. Growing space and site resources of light, water and nutrients that once supported the entire stand are more available to the remaining trees. Tree growth may accelerate or continue at about the same rate, depending on the degree of crowding prior to the cutting. Relief from crowding improves the merchantable volume, overall quality and market value of the residual trees in the stand.

Commercial thinning addresses long-term forest management goals of producing high quality hardwood timber for the future. Commercial thinning reduces stand densities, improves species composition, and retains the

healthiest trees. These treatments improve growth and vigor of the remaining trees and ultimately result in healthier forest conditions and higher quality timber for the future.

Single-Tree Selection - Single-tree selection is often used to increase the softwood component in mixedwood and hardwood stands by removing dominant competing hardwoods while maintaining an uneven-aged stand structure of the residual softwood and hardwood trees. This increases the softwood component and increases the age and structural diversity in these stands.

Individual trees are removed in a regular pattern throughout the stand; but unlike thinning, some trees are removed from each merchantable size class, from each age class, and from each level of the stand canopy. The selection cuttings are repeated at intervals averaging twenty years. Tree removal creates gaps throughout the stand canopy. Larger canopy gaps made by the removal of one-to-several dominant and co-dominant trees will allow light to reach the forest floor and provide growing space for reproduction. These openings are from $1/100^{th}$ to $1/10^{th}$ acre in size. Single-tree selection results in approximately one sixth of the unit in openings following treatment. Gaps of all sizes made by removal of individual upper and mid-canopy trees create growing space for crown and root expansion of neighboring trees. This results in their increased growth and vigor. Regeneration is a continuous process, with new generations of trees initiated in a regular pattern throughout the stand with each subsequent harvest entry.

Group Selection - This method appears as a pattern of small openings throughout a stand, usually covering about one-quarter of the land area in the stand. The cuttings are normally repeated at intervals of 15-20 years. Individual openings normally average one acre in size, though Forest Plan definition allows for openings up to two acres. For this project, openings in softwood or mixedwood areas would average less than one acre in size, whereas, openings in hardwood stands, many of which are severely damaged, would average closer to two acres. Reproduction is a continuous process, with new generations of trees colonizing new openings with each successive entry. The distinction between group selection openings and clearcuts is the small size of the opening. And, in a group selection opening, a larger percentage of exposed ground is shaded by adjacent trees, favoring shade-tolerant and intermediate species in these areas, with opportunity for sun loving species as well.

Stands prescribed for group selection treatments often are treated with single tree selection between the groups. Both systems are uneven aged management, and work well together to treat remaining portions of a stand during the initial entry if needed.

Appendix D

Project Mitigations for the Action Alternatives

In addition to the applicable Forest-wide and Management Area standards and guidelines listed in the Forest Plan (pages III-5 through III-29; III-36 through III-41 and Appendix VIIB; 18-22); the following specific mitigation and coordination measures are planned and apply to all action alternatives. Individual mitigations benefit several resources or mitigate several potential concerns.

Recreation and visuals

- A 50 foot slash disposal zone, where the slash from cutting trees would be removed to minimize potential adverse visual effects, would be established along Slippery Brook Trail (units 6, 8, 9, 10). A one hundred foot no-cut buffer along the Slippery Brook Trail would be implemented for unit 9 under alternative 2. The buffer would not be needed for no treatment or partial harvest under action alternatives 3 and 4.

Roads

- Restore to current design standards through pre-haul maintenance existing National Forest System Roads 17, 17A, 17B, 17C and 17G. Pre-haul maintenance would be to standards for dry surface or frozen ground conditions for subsequent hauling. Following harvest activities, culverts would be removed and road surfaces waterbarred, and roads returned to their closed condition.

- Borrow pits would not be permitted within foreground views of open roads or trails, or within the filter strip of a stream or pond. Excavation would not be allowed within the channels of live streams (Forest Plan, III-24).

- Appropriate safety signs would be placed along Forest roads and trails where harvest activities or log haul are occurring.

Cultural Resources

- Cultural resources are avoided in project design. No known sites occur in or near harvest operations. If any cultural resources are uncovered or otherwise discovered during sale activities, immediate cessation of operations and notification of the Forest Service is required.

Water Quality and Sedimentation

- Harvest activities may be suspended during periods of seasonal thaw to protect soil and water resources. Harvest and haul operations would be prohibited during the approximate mud season dates of March 15 to May 15.

- The integrity of vernal pools would be maintained. No ground equipment would be allowed in designated vernal pools at any time of the year. Canopy cover would be maintained in the 50 foot zone around the perimeter of any pool and disturbance to the forest floor would be minimized within that zone. Designated skid trails will be placed away from vernal pools.

- Trees whose roots support intermittent or perennial stream banks would not be removed in order to maintain riparian area stability. The exception would be at locations where skidtrail crossings are located.

- Trees that provide primary shade and leaf organic matter, or potentially would provide woody debris to the stream, would be retained along stream courses.

- Landings would not be created within 100 feet of a vernal pond or stream.

- Skidding within 100 feet of a pond or a flowing stream would be limited to dry or frozen ground conditions except on designated skid trails and at designated stream crossings. Exposed soil would be limited to less than 5% within riparian areas associated with designated streamcources shown on Sale Area Maps.

- All temporary bridge construction would be done in accordance with current standard specifications and with any required wetland permits.

- Skidding patterns would be laid out to minimize the number of stream crossings. Where appropriate, existing stream crossings would be used to minimize adverse cumulative effects to streambank stability or to water quality.

- Waterbars and other cross drainage structures would be installed to direct water off skid trails, allowing it to disperse and infiltrate into soils, minimizing erosion and effects on water quality.

- Skid roads would be designated to minimize soil compaction during skidding operations.

- Temporary crossing structures such as box culverts, pipes, or temporary bridges would be installed where skid trails cross flowing water. Where permanent culverts are employed on streams with fish populations, ensure fish passage is maintained.

- Temporary crossing structures would be removed and channel banks restored as needed following logging activities. The intent is to keep machinery out of wet areas and streambeds to minimize direct and indirect effects to water quality or streambank stability.

- Erosion control requirements including installation of water bars or other cross drainage structures on skid trails and temporary haul roads, removal of temporary culverts, weed-free erosion control seeding, fertilization or other soil stabilization activities would be implemented according to contractual requirements. Allow for natural regeneration of vegetation where possible.

- Within and adjacent to units listed below, riparian areas on either side of streamcources would be the width shown. Within these riparian areas, no more than 50% of the basal area would be removed and trees larger than 18 inches DBH (diameter at breast height) would be retained as per Forest Plan standards and guidelines on page III-15d (as amended on 11/6/89).

Riparian Type	Minimum Width	Units
17	50 ft. + (4 x % slope)	18, 19,
12, 15	50 ft. + (2 x % slope)	8, 9, 12, 13, 14, 15, 16, 20, 21, 25
20	50 ft. or floodplain to the top of the first terrace	8, 17,

- On closeout or when stopping harvest for more than 1 season, waterbar skid trails as per contract specifications. Seed landings and skid trails only where steepness of slopes may cause soil erosion. Use native seed determined to be non-invasive. Allow also for natural regeneration of vegetation in all locations.

Wildlife and Botanical

- Identification or discovery of any threatened, endangered or sensitive plant and animal species would be reported to the appropriate specialist and ground disturbing activities would immediately cease. Appropriate protective measures would be taken. This provision is required in all timber sales contracts and does not imply insufficient field surveys.

- Wildlife trees such as those suitable for cavity dwellers and mast production, would be reserved during layout and marking unless they pose a safety hazard to cutters or the public. For uneven-aged management, maintain a basal area no less than 1.25 to 2.5 square feet per acre in trees with a diameter of 18 inches or more and two or more major defects where attainable. Where possible reserve live trees with woodpecker cavities as they may provide roost sites for bats.

- Retain bear-clawed beech trees within each unit where present, to maintain this habitat feature.

- Reserve Trees would be retained to meet the terms and conditions of the Biological Opinion for the Forest Plan Amendment, and as prescribed for this project.

- Retain obvious wildlife trees during marking, especially those larger than 18 inches DBH per Forest Plan standards on page III-15d. Large (>18" DBH) unmarked live and dead hazard trees cut for safety reasons would be retained on site. Hazard trees along roads and trails may be marked for removal. In addition, marked trees found to be cull prior to or after cutting may be retained on site to provide wildlife habitat and to increase large woody material.

- Additional surveys for threatened, endangered and sensitive plant species are proposed in a few selected locations prior to implementation. Certain harvest units with potential habitat would be field reviewed again prior to treatment. Identification or discovery of any threatened, endangered or sensitive plant species during pre-work reviews prior to project implementation would be protected from ground disturbance. Appropriate protective measures would be taken. A provision protecting sensitive plant locations is required in all timber sales contracts.

- No whole tree harvesting would be allowed for this project. To facilitate branch and top removal in winter or brushy conditions, tops and limbs may be placed on skid trails, where they serve to reduce compaction or rutting.

- During marking of the proposed units, protect raptor nest trees and report their presence to the District

Biologist. The District Biologist would determine if further mitigation is needed.

- Detection of any threatened, endangered, or sensitive species during implementation of any of the alternatives would be reported to the District Biologist. Requirements to protect the species would be implemented.

- Bridge work would only occur between May and the end of September to avoid siltation during the eastern brook trout egg incubation period. Permanent culverts placed in fish-bearing streams shall be bottomless.
- Within clearcut units, reserve patches and reserve trees would be identified and protected to meet the terms and conditions of the Forest Plan Amendment (see the Environmental Assessment, Biological Opinion, and Forest Plan Amendment for the Indiana Bat).

- Harvest equipment would be washed to remove invasive plant material prior to being brought on National Forest.

Effect	Table 19. Mitigations for Water Quality	Source
Roadbed disturbance during spring	• Closure of roads for a period during spring. • Closure of operations during muddy and saturated conditions when needed.	Forest Plan Appendix E
Sediment transport from skid roads	• Winter harvest where feasible. • Location and number of skid trails agreed to in advance with the sale administrator. • Minimize number of skid trails • Skid trails would be on the contour where practical. • Drainage features would be designed to disperse runoff after collecting it.	Forest Plan Appendix E
	• Skid roads would be located on slopes 40 percent or less. • Where possible, skid trail grades would be 20% or less.	Appendix E S&G III-17
	• Spacing of cross drainage on skid trails would be guided as shown below (also found in the LMPIII-22) **Grade, %** 2-5 6-10 11-15 16-20 21-30 31-40 **Spacing, ft** 300-500 200-300 100-200 100 80 60	S&G III-22
landings	• Landings would not be located within 100 feet of a stream.	S&G III-18
Sediment from stream crossings on skid trails	• Where needed, silt fence or another effective methods would be used prevent sediment from reaching a stream course disturbed by crossing areas. • Channelized runoff from skids trails and roads would be dispersed before entering a riparian area. • Watershed protection measures such as waterbars and sediment control would be maintained as necessary until no longer needed. • Stream crossings would be restored as needed using shaping, matting, seeding, or other effective methods to restore stream morphology and function. • Install stream crossing structures at right angles to the stream channel in straight sections.	Forest Plan Appendix E
	• Skidding within 100 feet of a flowing stream would be limited to dry or frozen and/or snow covered ground conditions except on designated skid trails for stream crossings. Exposed soil would be limited to less than 5% of the riparian area.	S&G III-18
	• Locate skid roads outside of riparian areas to the extent possible • Align stream crossings so a minimum possible area is disturbed. • When possible avoid crossings at riparian types 10. • Stream width to depth ratio and gradient changes should be kept to a minimum and restored on temporary crossings. • Cross drainage on skids roads used in the timber sale would be directed into areas suitable for trapping sediment and not directly into a stream.	S&G III-21
	• For intermittent and ephemeral streams, specific protection measured would be prescribed on a site-by-site basis. Protection measures for intermittent and ephemeral streams with a definable/visible channel may include designated stream crossings and retention of trees adjacent to the channel.	S&G III-19

Appendix E - Glossary

Basal Area (BA) - The area of the cross section of a tree a 4.5 feet above the ground. Generally expressed as total Basal Area per acre. Under uneven-aged management, usually 30 to 40 percent of the basal area is removed. Under even-aged management, 30 to 100 percent of the basal area is removed depending upon the needed silvicultural treatment.

Ecological Land Type (ELT) - An area of land with a distinct combination of natural, physical, chemical, and biological properties that cause it to respond in a predictable and relatively uniform manner to the application of given management practices. In a relatively undisturbed state, or at a given stage (sere) of plant succession, an ELT is usually occupied by a predictable and relatively uniform plant community. Typical size of an ELT area is generally several hundred acres.

Ecological Land Type Phase - These are subdivisions of those ELTs where vegetation management is most common. They share the same characteristics as ELTs; however, their size is smaller (10-100 acres) and the biological and physical conditions are more limited. They are locally known as Forest Habitat Types.

Even-aged Management - A timber management system that results in the creation of stands where trees of essentially the same age grow together. Harvest methods producing even-aged stands are clearcut, thinning shelterwood, and seed tree.

Clearcutting - removal in a single harvest of the entire stand to prepare the area for rapid seed germination and growth of a new even-aged stand of shade intolerant trees. Shade intolerant trees are tree species that need full or near full sunlight to regenerate and grow.

Salvage Cut - Trees are harvested after some natural disturbance in order to salvage potential wood products before the trees become less valuable or unmerchantable. Depending on the severity of damage, the harvest may consist of harvest of individual trees or of groups of trees. In severe cases, all trees in a stand may be removed to begin a new stand. Disturbances include but are not limited to wind, ice storms, fire, insect infestations and disease.

Seed Tree – A harvest that leaves five or so dominant trees per acre as a seed source for the regenerating stand. A seed tree harvest appears similar to current clearcut units in that both prescriptions leave individual trees standing per acre within a unit to meet silvicultural or other resource objectives.

Shelterwood - This harvest method provides a source of seed and shade protection for regeneration. The original stand is removed down to a prescribed basal area, in two or more successive harvests. The first harvest is ordinarily the seed cutting (sometimes called the regeneration cut). A second harvest often follows a number of years later once regeneration is well established, and is referred to as a final harvest or shelterwood removal harvest. An even-aged stand results.

Thinning - Thinning operations where the harvested material can be sold on the market as opposed to pre-commercial thinning.

Forest Product - Sawtimber, millwood, pulpwood, and chipwood are the raw products utilized from a tree in a minimum piece length of 8 feet.

Sawtimber minimum piece specification requires a minimum diameter outside bark of 9.0 inches for softwood and 11.0 inches for hardwood and 40 percent sound wood.

Millwood minimum piece specification requires a minimum diameter outside bark of 8.0 inches for paper birch and 50 percent sound wood.

Pulpwood minimum piece specification requires a minimum diameter outside bark of 5.0 inches and 50 percent sound and reasonably straight.

Chipwood refers to utilization of that material beyond the merchantable top, including branches and the top. Chipwood does not meet minimum piece specifications for pulpwood.

Habitat Management Unit (HMU) - A large unit of land with boundaries commensurate with compartment boundaries, and which includes a mix of habitat types. At least one of these types must be a pond or stream with wetland potential.

Habitat Type - A small unit of land from a few to over 100 acres lying within a given climatic mineralogical zone and supporting a distinct successional sequence of vegetation growing on a unique type of soil material.

Indicator Species - A plant or animal species adapted to a particular kind of environment. The arrangement of habitats (by tree species and age group) reflects requirements for selected wildlife species. They are designated a management indicator species. Their presence is sufficient indication that specific habitat conditions are also present. These species represent groups of other species with similar habitat requirements.

Interdisciplinary (IDT) Team - A group of individuals with skills for management of different resources. An interdisciplinary team is assembled because no single scientific discipline is sufficient to adequately identify and resolve issues and problems. Team member interaction provides necessary insight to all stages of the process.

Projected Existing Condition of Habitat Management Unit - The existing acres of the community type by age class would change over time. The expected changes are projected to a future year that becomes the existing condition for that community type by age class.

Riparian Management Zone - A term used by the Forest Service which includes stream channels, lakes, adjacent riparian ecosystems, flood plains, and wetlands.

Road reconstruction - rebuilding a road to the standard originally constructed. For example, replacing temporary drainage structures, temporary removal of waterbars or other drainage features to allow for traffic, clearing vegetation that obstructs visibility and smoothing and grading road surfaces.

Road construction – building new road.

Temporary road – a low standard road constructed for a single entry with a minimum of disturbance and that is waterbarred and closed following use.

Silviculture - A combination of actions whereby Forests are tended, harvested, and replaced.

Stand (Forest) - A community of naturally or artificially established trees of any age sufficiently uniform in composition, constitution, age, spatial arrangement, or condition to be distinguishable from adjacent communities, thereby forming a silvicultural or management entity. A Hardwood Stand is defined as a stand which at least 75 percent of the overstory and understory are hardwood trees. A Softwood Stand is defined as a stand which at least 65 percent of the overstory and understory is softwood (conifer) trees. A Mixed wood Stand is defined as a stand with hardwoods trees mixed with softwoods trees. The 25 to 65 percent of this stand consists of red spruce, balsam fir, and eastern hemlock.

Streams - Non-perennial and perennial are two types of stream that the quantity of water can be measured.

Intermittent Streams - Streams with a defined channel that the quantity of flowing water can be measured except during the dry summer months.

Perennial Streams - Streams with a defined channel that the quantity of flowing water can be measured year round.

Uneven-aged management - The application of a combination of actions needed to maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Harvesting is usually regulated by specifying the number or proportion of trees of particular sizes to retain within each area, thereby maintaining a planned distribution of size classes. Harvest methods that develop and maintain uneven-aged stands are individual selection, improvement, and group selection, and salvage.

Individual Tree Selection - A method where individual trees are selected and harvested in a stand while maintaining a prescribed number of trees in each diameter class ("Q" Factor).

Improvement Cut - An interim step to developing an uneven-aged stand structure by removing lower quality stems, leaving a residual basal area of about 65-70 sq.ft. (hardwood) or 80 to 100 sq.ft. (mixed wood) per acre.

Group Selection - A harvest method that describes the silvicultural system in which trees are removed periodically in small groups, resulting in openings that do not exceed an acre or two in size. This leads to the formation of an uneven-aged stand, in the form of a mosaic of age-class groups in the same forest stand.

Overstory Removal – Mature trees are removed to release regeneration once it has become established, for example in a shelterwood final harvest.

"Q" Factor - A method used in uneven-aged management to express the desired number of trees by diameter class. A "Q" factor of 1.5 means that each diameter class would have 1.5 times the number of trees than the next highest diameter class.

Visual Quality Objectives - A desired level of scenic quality. Refers to the acceptable degree of alteration of the characteristic landscape:

Preservation - A visual quality objective that provides for ecological change only.

Retention - A visual quality objective that means that management activities are not evident to the casual Forest Visitor.

Partial Retention - A visual quality objective that means that management activities may be evident but must remain subordinate to the characteristic landscape.

Modification - A visual quality objective that means that management activities may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color, and texture.

Volume - The measure of quantity forest products (sawtimber, pulpwood, and chipwood).

Board Foot - A measure of lumber volume for sawtimber. The cubic equivalent of a piece of lumber 12 inches wide, 12 inches long, and 1 inch thick. MBF is the measure for 1000 board feet.

Cord - A measure of volume for pulpwood and millwood. One cord equals one stack of wood measuring 4 by 4 by 8 feet or the equivalent of 500 board feet.

Ton - A measure of volume for chipwood.

Appendix F

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APPENDIX G

Responses to Pubic Comments on the Chandler Round Environmental Assessment

The Chandler Round Environmental Assessment was offered for public review and comment for 30 days from March 24 through April 23, 2004. The invitation to comment was promoted through mailings, a Legal Ad in the Manchester Union Leader and posting the document on the White Mountain National Forest web site. Thirteen responses were received via email, conventional mail and personal visit.

Comments Received - Comments listed in Appendix G were received during the 30-day comment period for the Chandler Round Environmental Assessment. Comments responding to this Environmental Assessment during the 30-day comment period were reviewed to identify specific issues and concerns. Comments received did not lead to the need for additional or considerable analysis; therefore no substantial changes to the Chandler Round Mountain Vegetative Management Project EA were deemed necessary. We have included the key points in the comments and our responses to them. The original letters are in the Chandler Round Project File at the Saco Ranger Station.

Comment Numbers - Each comment is numbered. The number to the left of the decimal point identifies the commenter. The number to the right of the decimal point is the number of the comment. For example, comment 1.1 is the first comment from the first letter discussed herein. The postmark or receipt dates are noted (whichever is earliest).

Forest Service Responses - Each response is numbered the same as the corresponding comment. In some cases, two or more comments are similar enough that a single response is given. Comments were directed to the most appropriate person for response to a given topic. The FS responders were: Rick Alimi (ID Team Leader), Kathy Starke (Wildlife Biologist), Steve Fay (Soil Scientist), Tracy Weddle (Hydrologist), Rod Wilson (NEPA Coordinator), Rob Fallon (Forest NEPA Coordinator), and Terry Miller (District Ranger).

Commenters (in chronological order by date of postmark/receipt):

Postmark/Receipt

#	Name	Date
1.	Chester (Chet) Lucy, North Conway, NH	March 26, 2004
2.	Kristine Bontaites (Biologist), NH Fish and Game Dept.	March 30, 2004
3.	Iris Baird, Lancaster, NH	April 12, 2004
4.	Robert Richardson, Walpole, NH	April 14, 2004
5.	Pete Howland, Conway, NH	April 14, 2004
6.	NHTOA (New Hampshire Timberland Owners Association)	April 16, 2004
7.	Robert Stone, Bartlett, NH	April 16, 2004
8.	Bill McDougall, Intervale, NH	April 17, 2004
9.	Peter Bergh, New Castle, NH	April 19, 2004

10. Heather Dowey, The Wilderness Society	April 22, 2004
11. Tom Van Vechten (e-mail)	April 23, 2004
12. Nancy L. Girard, Conservation Law Foundation	April 23, 2004
13. Peter Gagne, Northern Extremes Snowmobiling	April 27, 2004

NOTE: The last commenter's letter was postmarked after close of the 30-day comment period, and therefore was not timely in accordance with 36CFR 215.6a. A response is nonetheless provided.

Comments Received and Forest Service Responses:

Comment 1.1: *The commenter visited the Ranger Station to return his copy of the EA in the interest of conserving paper, and otherwise expressed support for the project and multiple use forest management.*

Response to Comment 1.1: Comment is noted. The support for traditional forest management is typical of the view of many longtime residents of the Mount Washington Valley.

Comment 2.1: *"In order for the White Mountain National Forest to meet its objectives for wildlife, many more acres of regeneration must must be provided either through fire or clearcutting. Without this increase in regeneration many species of wildlife will not prosper; among them moose, deer, hare, several species of warblers and their attendant predators. Alternative 2 provides the greatest acreage of clear cuts while maintaining more than a sufficient quantity of mature and over mature timber. In addition, this alternative increases the softwood component on appropriate sites which will be of great benefit to both white-tailed deer and snowshoe hare and their attendant predators. The resulting aspen regeneration would be of enormous benefit to ruffed grouse, moose, woodcock, and morning and chestnut-sided warblers."*

Response to Comment 2.1: This comment corresponds with the findings and recommendations of our wildlife biologists, as noted in the EA pages 98-105. The Forest Service has a cooperative interest in working with New Hampshire Fish and Game to meet our mutual objectives for the betterment of game and non-game species on the White Mountain National Forest.

Comment 2.2: *"The New Hampshire Fish and Game Department supports Alternative 2 as the best alternative for the formation of wildlife habitat."*

Comment 4.2: *"In summary, I am in support of Alternative 2 and encourage you to procede accordingly."*

Comment 5.1: *"I would prefer Alt. #4 or #2. These would allow for a more diverse opportunity for wildlife. The area out there needs much more diversification."*

Comment 6.1: *"NHTOA supports the Proposed Action, Alternative 2…"*

Comment 7.3: *"I support Alternative 1, "No Action"."*

Comment 8.4: *"I therefore support alternative #1, "no action"."*

Comment 9.1: *"I am writing specifically to support the Alternative 3…"*

Comment 10.1: *"Overall, we are supportive of Alternate 3."*

Comment 11.4: *"…I find that alternative 3 would create the conditions that I feel would be most valuable…"*

Response to Comment 2.2, 4.2, 5.1, 6.1, 7.3, 8.4, 9.1, 10.1, 11.4: Comments are noted and the views of the respondents are appreciated. All alternatives have pros and cons to consider and individuals or groups may have a preference for one over another. One of the purposes of the EA is to disclose the effects of the alternatives so that comparisons and an informed decision can be made by the decision maker.

Comment 3.1: *"I'm still having trouble sorting out this project with respect to endangered or threatened plant species in the area. Your table on p. 129ff and the comments on p. 117-118 don't quite match up. Since panax and triphora (and the carex and dicentra, for that matter) don't appear on both."*

Response to Comment 3.1: The table beginning on pg 129 (now pg 138 in the EA) and the comments on pages 117-118 (now pages 125-126 in the EA) address different kinds of species and are not intended to match.

The comments on pages 125-126 address Federally-listed Threatened, Endangered and Proposed Species (TEPS) and the Regional Forester's Sensitive Species (RFSS). The risk assessment for these species is included in a Biological Evaluation (BE), which is included in the project record. The Biological Evaluation is required by the Endangered Species Act to ensure that proposed actions do not contribute to loss of viability for TEPS and that these species receive full consideration in the decision making process. The Forest Service includes RFSS that are known or likely to occur within the project area in the Biological Evaluation. RFSS are those species for which viability has been identified as a concern in Forest Plan revision, and for which management practices are designed to prevent these species from becoming threatened or endangered. The BE includes a determination on the effects of the proposed action. The analysis and determination in the BE are reviewed by the U.S. Fish and Wildlife Service (FWS). The FWS reviewed and concurred with the analysis and determinations in the Chandler Round BE. Pages 125-126 are a summary of the analysis and determinations found in the Biological Evaluation.

The table beginning on page 138 summarizes the analysis of effects for those species that are not currently listed as RFSS, but which have been reviewed by a panel of experts (NHNHB, NEWFS, etc.) and have been nominated by the White Mountain National

Forest for addition to the RFSS list. These species are being considered, but will not be added to the RFSS until Forest Plan Revision is complete. We believe these species to be of concern; however, since they have not yet met the level of concern for inclusion in the Biological Evaluation, we have addressed them separately. We call these "Species with Potential Viability Concerns". We analyze the potential effects on these species using the same standards we use for RFSS.

Taken together, the Biological Evaluation (summarized on pages 124-126) and the "Species with Potential Viability Concerns" (table beginning on page 138) provide a comprehensive analysis of effects resulting from this proposed action on any species with viability concerns that occurs or is likely to occur within the project area.

Comment 4.1: *"I continue to be in support of both sustained yield timber harvest and wildlife habitat improvement on the WMNF. With respect to logging, I am confident that, as the Forest Service applies environmentally sensitive logging practices, minimal negative impact will result. We need and use the wood and paper products that are the result of these projects and the forest is a renewable resource that will regenerate vigorously."*

Response to Comment 4.1: Comment is noted.

Comment 6.2: *"Sound clearcutting practices are scientifically proven to be the optimum tool for providing silvicultural and wildlife vegetation goals and should not be ruled out due to public ignorance. Furthermore, careful layout, which the professional staff of the WMNF has undertaken, alleviates much of the negative (albeit brief) visual impacts. Thus, NHTOA feels the public's "clearcutting opinion" should not be a controlling factor which inhibits the Forest Service's ability to reach the Desired Future Condition for the Forest."*

Response to Comment 6.2: Comment is noted

Comment 7.1: *"Due to ongoing home-building activity along and at the terminus of this Road, there is increased heavy equipment traffic already. The Road is currently in heavy residential and recreational use as well. Additionally, Town Hall Road is the only Public Access Road to the Slippery Brook/Mountain Pond area. The continual presence of logging trucks and heavy equipment would be extremely detrimental to public safety. Furthermore, the increased use raises roadway maintenance issues for the Town of Bartlett."*

Response to Comment 7.1: As stated in the EA on pages 156-157 all logging operations would follow all federal, state and contractual requirements to insure the safety of other forest users and travelers on Town Hall Road. The sale contract requires safety signs on all Forest Roads and trails where activities are occurring. Log truck drivers are required to maintain safe speeds, follow posted speed limits, and meet all contractual requirements. Violations can result in contract shut downs. Town Hall and Slippery Brook roads have been used for three decades to haul timber. We have no record of

safety issues related specifically to logging traffic on these roads, and we believe that the continued use of these roads by logging trucks is consistent with their management.

Regarding increased maintenance of roads, these costs were factored into the socio-economics analysis (section 3.6) of the EA. The Forest Service, through the Forest Highway program, and in cooperation with the state and town, invested over $450,000 in 1999-2000 to reconstruct and pave Town Hall Road, to ensure that it can continue to function in a safe, useable condition for all users, including logging trucks.

Comment 7.2: *"Finally, the cover sheet of the EA, page iii ,details the potential financial gain to the Towns of Jackson and Chatham. The timber harvest must be hauled through Bartlett. To me the omission is telling."*

Response to 7.2: The Towns of Jackson and Chatham do receive the larger share of funds generated by this project because the area that would be harvested lies in their boundaries, therefore they collect the 10% yield tax from the value of timber harvested. Payment of yield taxes on timber sales is required by NH State law and the Forest Service has no control or influence over it. All towns within the boundaries of the national forest, including Bartlett, share in the 25% fund payments that are made from revenue collected on all projects, regardless of where they occur on the forest. See pages 93-97 of the EA for a more detailed explination of the economics of the project.

Comment 8.1: *"I feel that the silvicultural practice of clearcutting for the stated goals of increased early successional habitat and increasing the amount of softwood stands to increase Wildlife Diversity should not be practiced in the National Forest. Creating 20-30 acre holes in the forest canopy on land surrounded by thousands of acres of forest is not going to significantly increase Wildlife Diversity in these particular areas. The effects of soil erosion, scarred views from many local vantage points and trails closed to snowmobilers, etc. will far outweigh any increased potential benefit from increased Wildlife Diversity."*

Comment 10.2: *"While we note the decrease in clearcutting treatments in Alternative 3, we would like to again voice our belief that it should not be a silvicultural practice on the White Mountain National Forest. We ask that the two remaining stands proposed for clearcutting (units 2 and 7) in Alternative 3 should instead be proposed for havest using methodes that better mimic natural disturbance, i.e. single-tree selection, group selection group selection or a delayed shelterwood cut." …"Second, we do not believe that the role of the White Mountain National Forest should include creating more early successional wildlife habitat."*

Response to 8.1, 10.2: Some have disagreed with the need for early successional habitat in recent years. Nevertheless, the habitat management strategy contained in the Forest Plan (Appendix B) is heavily reliant on the availability of several management tools to maintain a range of forest conditions on the National Forest. Prominent among these tools is clearcutting, which creates early successional habitat. The scientific and research communities within the Forest Service and cooperative State agencies continue to support

the wildlife habitat management strategy employed on the White Mountain National Forest. Recent and ongoing research at the Bartlett and Hubbard Brook Experimental Stations continues to provide data to reinforce this strategy . The recent article titled "Wildlife in the White Mountain National Forest" written by Darrel Covell and published by UNH Cooperative Extension "Habitats" Summer 2002 is one example of this research. The full article can be found on the web at: http://ceinfo.unh.edu/forestry/documents/HabSum02.pdf Excerpts are included below.

"Some of the highest priority 'birds of management concern' in the northeastern U.S. are those that prefer the aspen-birch (young forest) type, including chestnut-sided warbler, golden-winged warbler, Nashville warbler, ruffed grouse, and American woodcock. In fact, among forest birds, those dependent on regenerating and scrub habitats have the highest percent (48%) of species with significant population declines in the northeast since 1966."

"Some active management is needed to maintain the full spectrum of wildlife diversity on the WMNF."

Comment 8.2: *"The potential effects on the native Eastern Brook Trout could be devastating. … Appendix D states "Skidding patterns would be laid out to minimize the number of stream crossings". This would create direct siltation of the fishery habitat that could negatively affect the fish population. The EA further states "Bridge work would only occur between May and the end of September to avoid siltation during the Eastern Brook Trout incubation". I have caught (and released) egg bearing fish in the months of August and September. The bridge work should not occur till after the month of September.*

Also the maps depict logging activity adjacent to the East Branch of the Saco River and there is no provision in this plan to minimize the impact to the Eastern Brook Trout population in this area.

Response to Comment 8.2: The Chandler Round EA addresses fisheries concerns in section 3.9 (pages 121-122). It states **"**Factors that are important to maintain quality habitat for brook trout include cool continuous flowing water, unimpeded travel upstream and downstream, clean gravels for spawning and egg incubation, clear water during the growing season, instream cover, adequate food supply (usually macroinvertebrates), high quality headwater streams, and suitable riparian habitat." During the time that logging activities and bridge work take place the trout population is mobile and can avoid the minor and short term siltation that may take place from stream crossings. Egg bearing fish typically deposit eggs after September and the mitigations in the EA are designed to protect the eggs from sedimentation during the incubation period.
While the boundary of HMU 505 includes a section along the East Branch of the Saco River, there are no timber harvest units, and no other activities, proposed adjacent to or near this river.

Comment 8.3: *"Since this area is adjacent to the proposed Wild River Wilderness Area,*

the Kearsarge Roadless Area and the Mountain Pond Research Natural Area, this unit should not be disrupted by this proposed logging activity and should be left in its natural state."

Comment 10.2: *"The Wilderness society is concerned with protection and integrity of the remaining Roadless Areas in the White Mountain National Forest due to the intense resource pressure put on wild lands within the heavily populated Northeast."*

Comment 12.1: *"The importance of careful review and consideration of timber management activities on roadless areas in the White Mountain National Forest (WMNF) are discussed extensively in Mountain Treasures (MT). The need for protecting these designated areas from timbering, pending further planning pursuant to the current WMNF Plan Revision proceedings is also clear. Based on our review of the EA, it appears that significant portions of most of the units are designated for protection in MT. The EA does not, however, address specifically the issues raised by the MT designations or the proposal for the Friends of the Wild River proposal. CLF therefore requests that the status of the lands included in the proposed stands be clarified, and any MT designated areas and Wild River areas be removed from timber management areas in Alternatives 2, 3 and 4."*

Response to Comment 8.3, 10.2, 12.1: As part of the Forest Plan Revision process, the White Mountain National Forest is required by the National Forest Management Act to re-inventory the National Forest for Roadless Areas, and then evaluate the capability and availability of these areas for consideration as potential Wilderness. Those areas that are capable and available may then be included as potential Wilderness in the alternatives for Forest Plan Revision. Forest Plan Revision must take into account the need, both locally and nationally, for more Wilderness; so there may be some newly inventoried Roadless Areas that are not included as potential Wilderness in the alternatives. A determination of which areas will be recommended as potential Wilderness is made as part of the Record of Decision and the Final Environmental Impact Statement for the Forest Plan Revision. Only the United States Congress can determine whether a recommended area is actually designated as a Wilderness.

The process by which the White Mountain National Forest has re-inventoried the Forest land base for Roadless Areas, and then evaluated the potential of these areas for recommendation as Wilderness, is prescribed in Forest Service Handbook 1909.12. This process reconsiders all lands on the National Forest for their roadless characteristics, accounting for new land acquisitions, changes to the landscape since the last Forest Plan, and improved computer technology for evaluating areas. The new inventory includes 17 Roadless Areas totaling nearly 508,000 acres (including 114,000 acres of existing Wilderness). The new inventory has expanded the Wild River Roadless Area to include 71,387 National Forest acres.

There are other organizations with specific concerns about the future management of the White Mountain National Forest who have conducted their own assessment of potential Roadless Areas and opportunities for Wilderness designation. A group of organizations

conducted a private collaborative effort they called "Mountain Treasures" that preceded the Forest Plan Revision Roadless Area Inventory conducted by the Forest Service. Using the information that was available to them at the time, Mountain Treasures identified potential Roadless Areas on the National Forest, and made recommendations on which of these areas they thought should be considered as Wilderness. Another organization, the Friends of the Wild River, made their own proposal regarding potential Wilderness that was specific to the Wild River area.

The direction for conducting a Roadless Area Inventory and Wilderness Evaluation on a National Forest is found in the Forest Service Manual (Chapter 1920) and Forest Service Handbook 1909.12. This is the direction used by the White Mountain National Forest as part of the Plan Revision Process. Any concern or issue relative to this inventory and evaluation, or the process used to conduct it, is beyond the scope of this project, and should be raised during the public comment period for the Draft Environmental Impact Statement for the Revision of the White Mountain National Forest Land and Resource Management Plan.

Regarding the specific activities included in the decision to implement the Proposed Action for the Chandler Round Vegetation Management Project; none of these activities, considered directly, indirectly or cumulatively, would preclude the Wild River Roadless Area (as defined by the Plan Revision Roadless Area Inventory) – or any other area of the White Mountain National Forest – from inclusion in the Plan Revision Roadless Area Inventory or consideration as a recommended Wilderness in the Forest Plan Revision.

The Chandler Round EA analyzes the direct, indirect and cumulative effects of the Proposed Action and its alternatives on the roadless and Wilderness character of the Wild River Roadless Area (EA pages 44-49). This analysis concludes that the Proposed Action (and its alternatives) will add cumulatively to the degree of disturbance within the Wild River Roadless Area; but it will not result in an irreversible or irretrievable change in the condition of the land, its inclusion in the Roadless Area Inventory, or its capability as potential Wilderness. The Responsible Official has considered these effects, as well as the public comments regarding this issue, in deciding to implement the Proposed Action.

Comment 11.1: *"I do not believe I made the comment about brooks attributed to me in the Water section on page 143 of the EA…"*

Response to Comment 11.1: You are correct. We mislabeled the comment. It was made by Robert Stone.

Comment 11.2: "*Why does the Table 19 of future condition expect zero acres of regeneration habitat when natural disturbance can be expected to take place?"*

Response to Comment 11.2: You are correct in stating that natural disturbance can be expected to take place. We do not attempt to predict natural disturbances that may or may not take place in the future. We assume that any disturbance that took place would affect the amount of regeneration habitat the same (a constant) between all alternatives and

therefore would not change the relative relationships between them. In addition not all natural disturbances create early successional habitat.

Comment 11.3: *"In Appendix B, Vegetation, in your response to a comment from Pierce Beij, it states that there are 33K acres of softwood, and 60K acres of hardwood, at "lower elevations" in M.A.s other than 2.1 and 3.1. I would very much like additional information on this point, such as the location, elevation, size of these tracts, and what is the definition of the phrase "lower elevations"."*

Response to Comment 11.3: The term "lower elevations" refers to elevations of 2500' or below. The acreage referenced above is located in parcels of various size distributed across the National Forest.

Comment 12.2 *As the EA acknowledges, the harvesting activities proposed in alternatives 2, 3 and 4 will contribute to lowering the buffering capacity of the soils. (Section 3.4.2) The EA must therefore include sufficient analysis of existing soil and vegetative conditions, potential impacts on soil and water quality from acid deposition, and a thorough analysis of the potential impacts to Alternatives 2, 3 and 4 resulting from acid precipitation in combination with the proposed harvesting and potential impacts on regeneration.*

Extensive research and numerous research publications have documented the impacts to soil buffering capacity from decades of acid precipitation, and the resulting impacts on forest productivity. Important research articles include: Likens, G.E., Driscoll, C.T., Buso, D.C., Mitchell, M.J., Lovett, G.M., Bailey, S.W., Siccama, T.G., Reiners, W.A., and Alewell, C. 2002. [Many other publications are listed as additional references].

The analysis of impacts in the EA focuses solely on approximations of percentage losses of soil calcium. The methodology for the percentage calculations is impacts is not, however, described or contained in the EA or in the peer reviewed and published research articles referenced in the EA. [1] *It is therefore not possible to assess in any practical way the applicability or usefulness of these percentage calculations. Numerous peer reviewed and published research studies describe accepted techniques for assessing forest soil and plant conditions, and techniques for correlating those results to potential impacts to forest stand health.*

[In addition], "no on site testing of soil conditions in the stands to be harvested, or other specific efforts to assess the current status of tree health and those stands, given the acid deposition to these forest stands that has already occurred, is described in the EA. Given that these methods are readily available, efforts should be made to assess current soil and tree conditions in the stands to be impacted in order to specifically determine the additional impacts of timbering and potential for adequate regeneration."

Moreover, even the cursory calculations of calcium losses contained in the EA raise significant questions as to the effect of these losses. There is no specific discussion of the potential implication these losses will have on forest regeneration and growth. For example, McLaughlin, et al (1999) concludes whole tree harvesting can cause significant calcium loss, and that recovery of calcium can be quite slow. See also, Likens, G.E., Driscoll, C.T., Buso, D.C. 1996. Long-Term Effects of Acid Rain: Response and Recovery of a Forest Ecosystem. Science 272: 244-246.

In conclusion, the peer reviewed and published research site above, and the numerous sources discussed and cited therein, calls into question the assumptions made in the EA concerning impacts of timber harvesting in the WMNF, including harvest rates and management practices. The methodologies use to determine percentage calculations described in the EA are not adequately described or supported. The EA therefore fails to provide adequate detail and analysis of the impacts of acid precipitation on the soil, water and vegetative resources of the stands slated for harvest.

Response to Comment 12.2:

The EA states the following paragraphs in section 3.4.2 : "In general, soil calcium concentrations are expected to be relatively low in this southeastern portion of the Forest. This is based on the current version of the till source model. The till source model is a cooperative effort to characterize base cations, including calcium, across the White Mountain National Forest (See map in Project File). The model is currently going through verification based on actual soil chemistry measurements at 40 long-term soil monitoring plots representing the range of soil calcium expected on the White Mountain National Forest.

Soil calcium in the Project Area has probably been affected by atmospheric deposition and early timber harvest. Based on research at Hubbard Brook, it was originally estimated that 4.6% of the total soil calcium may have been lost since 1950 when acid rain began in earnest (Federer 1989)[1]. Using updated information that includes mineral weathering (Likens et al., 1998), this number can be reduced to about 1.8%[1]. Land use records indicate the Chandler Round area was harvested in the early part of the 1900s, and that the stands were "lightly culled" (Goodale, 1999). This would translate into about a <1% loss of soil calcium (Fay et al., 1993). The history of all stands is not known, but large portions of this vicinity were treated this way. It is estimated, therefore, that about 2.8% of the total soil calcium may have been lost due to atmospheric deposition and timber harvest up to today.

The timber sale program for the White Mountain National Forest, including sales such as Chandler Round, has been in the range of 20-24 MMBF per year. This is about 1/3 of the long term sustained yield on suitable timberland on the Forest, which was estimated at 69 MMBF (1986 Forest Plan FEIS). This shows that current growth far exceeds harvest, and that overall, interruption of the calcium cycle by harvesting is relatively infrequent and widely spread. Second, rotation length where clear-cutting is proposed in northern hardwoods is 120-years between harvests. This is not only consistent with silvicultural guides, but also, does not raise the level of concern for management of National Forest lands to the same level as is sometimes expressed when rotation lengths are short, such as

40-years (Federer et al., 1989). Third, there is no proposal, in this case, to practice whole-tree harvest; therefore, from the outset, approximately 1/3 of the calcium that might be removed would remain on site for re-cycling into the ecosystem (see Project File, Sugar Maple Biomass and Calcium Content, provided in Response to Comments, Appendix G). And finally, based on Pnet:BGC modeling at Hubbard Brook Experimental Forest, atmospheric deposition is by far the largest factor in potential changes in soil base saturation and exchangeable soil calcium as compared to forest harvesting (Solomon et al., 2003)."

The EA goes on to state **"**Harvest and removal of forest products takes away calcium that would otherwise be recycled to the forest floor. Clear-cut harvest by conventional bole-only harvest removes approximately 187 Kg/ha of calcium that equates to approximately 2% of the total soil calcium supply. Thinning and singletree selection removes 44 Kg/ha that equates to less than approximately 1% of the total calcium supply in the soil. The acres of clear-cut and singletree or thinning by alternative on the Chandler Round Sale are as follows:"…. At which point the Direct and Indirect Effects Table , section 3.4.2.1 is presented.

Cumulative soil calcium effects are also disclosed, in EA Section 3.4.2.2, where the EA states ". The lowest cumulative depletion would occur in Alternative 3, with the fewest acres of clearcuts. These estimates must be tempered by other factors affecting our understanding of the calcium cycle.

First, we have learned much more about the calcium cycle from research at the Hubbard Brook Experimental Forest since the original estimates were made in 1989 (Likens et al., 1998). It is now possible to include mineral weathering in the soil calcium loss estimates, and this indicates that soil calcium losses have declined substantially compared to original estimates (Federer et al., 1989). (see Appendix G).

In addition, there is now research taking place by Forest Service and University scientists on calcium oxalate, which has never been accounted for in the calcium budget (Bailey, Pers. Comm), and can lead no where but further decreasing current depletion estimates. There is also research taking place on National Forest lands exploring apetite feldspar as another possible unaccounted for source of soil calcium (Hamburg et al., 2003). Both the calcium oxalate and feldspar studies are directly applicable to the White Mountain National Forest.

With respect to these new possible sources of soil calcium, the research related to appetite feldspar (non-silicate minerals) reveals that young forests are apparently accessing calcium from the soil from sources other than those traditionally considered. This research suggests the potential for acid deposition to deplete calcium is greater in old stands, than young stands (Hamburg et al., 2003). But also, relevant to how the magnitude of effects are characterized in this and other analysis, it is a reminder not to be too tempted by the apparent simplicity of small watershed mass balance studies when other mechanisms (biological) may cast significant new light on the potential impacts.

Second, there is direct measurement evidence, pre- and post-harvest, where whole-tree cutting was used with a clear-cut in a northern hardwood stand on basal till soils. It shows that exchangeable soil calcium pools have not changed over an eight year period

post harvest at the Hubbard Brook Experimental Forest (Johnson et al., 1997). The authors report that "it is clear that whole-tree harvest clear-cutting has not significantly depleted exchangeable nutrient cation pools on W5 (watershed) 8 years after clear-cutting". And "Third, calcium depletion is a dynamic problem where factors such as improvements in air quality will incrementally change the outcome over time. The measurements on small watershed studies (Federer et al., 1989) represent a static view of these relationships that has been a really good starting point, but it does bring with it some cautions in application of the information because improvements in some aspects of air quality are occurring since passage of the Clean Air Act (Likens et al., 1996)." See the EA section 3.4.2.2 for the full narrative.

In addition: the project record includes the following excerpts to the soils input:

Regarding **Depletion Calculations, "**the calculations made to estimate impacts on total soil calcium in the analysis. This response is an expansion of the information presented in the EA and the Response to Comment 12.2 above about the magnitude of impacts from acid deposition and timber harvest.

In 1993, Dr. Jim Hornbeck (retired, Northeast Research Station) and Steve Fay (Forest Soil Scientist, WMNF) derived the first approximation nutrient depletion tables for the White Mountain National Forest (Fay, Hornbeck, 1993). At the time, depletion had been estimated based on small watershed mass balance studies at Hubbard Brook Experimental Forest. These studies indicated that over a 120-year period 11% of the total soil calcium might be lost due to acid deposition (Federer et al., 1989). The relevant section is Table 4 on page 597. While this is an indirect measure, it was the best available information at the time. Watershed mass balance studies are expensive, long-term investments.

There was also information available about the quantity of calcium that resides in trees (Hornbeck et al., 1990). The relevant section is Table 3 on page 60 where it reports for calcium, and other base cations, the quantity of calcium taken away in a whole-tree harvest. It is possible based on existing information about the distribution of calcium in trees to estimate calcium removal if bole-only harvest is applied; and, also, if the harvest method is something other than clear-cut, say a thinning.

It was possible, therefore, to make a first approximation of the possible base cation losses that might occur due atmospheric deposition over some pre-determined period of time; but also, as you can see in the Depletion Table (Fay, Hornbeck 1993) for northern hardwoods and softwoods, we could include the possible impacts of different harvest practices. We built the harvest practices to represent those that might be used on this Forest. You will notice that we included whole-tree and conventional bole-only harvest; and thinning and uneven-age (or improvement cuts) in the table (see project record).

Now, therefore, you can go to the analysis for the proposed Chandler Round Timber Sale. If you take 4.2% times .42 (or 50 years) it equals an estimated total soil loss of 1.8% for the approximately 50 years since industrialization. The early harvests in this area were

estimated to be light harvests (Goodale, 1999), so we applied <1% to account for this previous harvest (Hornbeck and Fay, 1993). This means up to 2.8% of the total soil calcium might have been lost due to early harvest and acid deposition. The current harvest includes clear-cut and thinning, so, using the clear-cut as an example, and using bole-only harvest (not whole-tree harvest), this would remove an estimated 2% loss. Limited foreseeable future harvest is planned for this area, but there will be a continuation of acid deposition, so we estimated that out for 20 years, or 0.70% (20/120 times 4.2%)**."**

ANALYSIS METHODS

Finally, CLF raises a point about the use of various analytical methods to evaluate the site specific possibility of forest health or productivity susceptibility related to soil acidification. The methods they suggest include bio-indicators (Shortle et al), Ca:Al ratio's (Crogin et al., 1995, and the Profile Model. Their comments suggest these methods are routinely applied.

First of all, we have been working intensively during the past 5-7 years building information relevant exactly to this purpose. While it is currently difficult to make a case that acid deposition and harvesting has lead to any change in health or productivity on this Forest, the fact remains we are watching this carefully. In cooperation with the Northeast Research Station and Complex Systems at UNH, this Forest has a forest-wide foliar chemistry data set for nitrogen and calcium. With their leadership, it is not only possible to characterize forest productivity across this entire, complex landscape, based on the close linkage between foliar nitrogen and photosynthesis; but also, it is possible to focus on specific areas, improve the corrections for atmospheric conditions, and make assessments about forest productivity. There is also a forest-wide canopy chemistry data set for calcium, which we hope may be useful to connect foliar chemistry (and health) to soil chemistry and soil sensitivity to acid deposition. As already shared, we have installed a systematically located set of permanent plots across a range of soil calcium concentrations. Initial evaluation appears to confirm that we can relate foliar calcium and soil calcium concentrations. As pointed out in NAPAP (1998) and other sources (McLaughlin et al., 1999; Schaberg et al., 2001)), foliar calcium is a significant factor in disease resistance, cell wall division, and other critical plant processes. We are hopeful that we may actually start to make connections between foliar calcium, soil calcium (exchangeable or total) and forest health and productivity. Using thresholds that are being developed, this may actually allow quantitative site specific evaluations in the future.

We are well aware that current thinking about the possible impacts of soil acidification relies on the concept of multiple stressors, and that it is not a simple cause and effect relationship. This is why we have begun to accumulate information on insect and disease records, and are starting to engage scientists on the important topic of drought. At present, insects, disease and drought do not appear to be frequent factors on the White Mountain National Forest. Thanks to the efforts of a doctoral student, we have a land use map of the Forest at the time various parcels were purchased by the National Forest, so land use can at least be considered in our evaluations. The goal of all this effort is to try

and map areas of different sensitivity to acidification relying on the very site specific information developed from our till source plots, foliar chemistry and imagery.

We would be thrilled if there were a simple, easily applied method to site-specifically and routinely evaluate possible effects of soil acidification on forest health or productivity. However, as reported in the 1998 NAPAP report by recognized scientists, "tools to assess present conditions or susceptibility to nutrient depletion are not readily available or widely applicable" (pg. 58). We do not find that there are routine methods available that can make clear, site-specific, evaluations of possible changes in forest health.

Regarding **Bio-Indicators,** Forest Service soils scientists have spoken directly to the scientists who derived the bio-indicators method using polyamines and to other scientists familiar with the work. Clearly, significant effort has been made to develop the methods, and to trial them at a variety of sites. This includes application at sites where soil chemistry data suggest acidification may be a concern. The scientists devising this method both acknowledge that this method is still in the research phase (Shortle and Minocha, Personal Communication, 2004). Also, this is a general indicator of stress and not related to a single cause. Work needs to be done if concepts and techniques derived from research on tree biology are to find practical application to forest management problems. This would likely include soil chemistry and foliar chemistry. But, like much other work on forest health, there are always multiple stressors involved, and sorting them out is complex.

Cronin and Grigle's report on indicators such as calcium:aluminum ratios is a survey of what is believed to be known based primarily on seedling studies in pot culture and hydroponics. In addition, it deals with the chemistry of the soil solution, which is different than the soil exchange sites, which is the main source of base cations for forest trees. Forest Service soils scientists spoke directly to bio-geochemists involved in soil chemistry and forest health research, and it was confirmed that have been no studies in an actual forest setting directly related to the use of measures suggested in this article (Bailey, Personal Communication). However, the first field based studies are actually planned for the field season of 2004, so more information on this approach may become available in the reasonably near future.

Finally, there was also a suggestion by Conservation Law Foundation that the Forest Service try and apply the critical loads methodology. This Forest has attributed the approximately 35 parameters necessary to run the International Version of this model. This effort, however, made certain things very clear. First, the key element of mineralogy, despite the fact we have developed a till source model for the White Mountain National Forest, is not well developed for this or other landscapes. Original runs lead to grossly erroneous stream water chemistry. Second, to our knowledge, no one has done the necessary field tests to be sure that a second key factor, soil specific surface area, is actually well estimated based on soil texture. In addition, there are still issues with soil depth, changing water tables and rooting depth. Therefore, while we know this method is used for landscape scale estimates of soil sensitivity in Great Britain and Europe, and is being mapped in New England, its application at the site or regional scale

still needs a lot of affirmation to be sure of its usefulness. In addition, being a static model, it provides no time frame for when forest health issues may, or may not arise, so its usefulness for impact assessments, as compared to a general level of concern, seems uncertain.

The EA, summarizes much of this information, or draws conclusions based on the above information without displaying all of it in the EA for the sake of brevity. However the EA makes conclusions in section 3.4.2.3 regarding Forest Productivity, in section 3.4.2.4 regarding Changes in Forest Health, and in section 3.4.2.5 regarding Integrated Cumulative Effects.

Some of those conclusions include the following:

- From EA section 3.4.2.3, Forest Productivity, "Based on these studies, we have no reason to suspect, therefore, that any of the alternatives contemplated in our environmental analysis, even in the face of atmospheric deposition, will lead to any change in forest productivity. In fact, a separate review of even-age timber stands in the Conway area where Chandler Round is proposed, including clear-cut and whole-tree harvest, demonstrates that these harvested areas have biomass accumulation consistent with the biomass curve derived on the detailed plot data at the Bartlett Experimental Forest (Leak, Fay 1997).
- From EA section 3.4.2.4, Changes in Forest Health, "Despite the fact that there is little evidence of sugar maple decline on the White Mountain National Forest, The Forest has invoked a cooperative effort with the Northeast Research Station in Durham, N.H. to monitor and implement research on northern hardwood health and productivity, including sugar maple, consistent with the NAPAP (1998) recommendations." And "In summary, there is no evidence that would lead to a conclusion that there would be a forest health impact based on the cumulative effects of acid rain and timber harvest at the Chandler Round Timber Sale. In addition, interdisciplinary team field reconaissance in the hardwood stands proposed for harvest showed no evidence of mortality that appeared unusual."
- And finally, from EA section 3.4.2.5, Integrated Cumulative Effects, "Despite all the concern about soil calcium depletion, the overall threat it poses to forest health is largely unknown (Schaberg et al., 2001). However, and significantly, the need for long-term forest productivity monitoring and evaluation (Schaberg et al., 2001) has been accomplished (and measured) in terms of trends in biomass accumulation based on measurements since 1931 (Neungsigkapian, 1998) and remote sensing (Smith et al., 2002). This research by Forest Service and University scientists makes it clear that because biomass values reached by older, even-aged stands today are comparable to old growth forests before WWII industrialization; and, it is not apparent, based on conventional forest mensurational techniques, that trends in biomass accumulation have changed over time."

Comment 12.3*:* *"The EA differentiates between the summer/fall harvest (10%) and the winter harvest (1%) in terms of the intensity of ground disturbance. This should be*

factored into the timing of the sale in order to limit the amount and time of impact to as small as possible in accordance with New Hampshire's regulations."

Response to Comment 12.3: The state of New Hampshire requires that impacts to Outstanding Resource Waters (ORWs) be minimized. As stated in the EA, "Some limited point and nonpoint source discharges may be allowed, provided that they are of limited activity that results in no more than temporary and short-term changes in water quality. 'Temporary and short-term' means that degradation is limited to the shortest possible time. Such activities shall not permanently degrade water quality or result at any time in water quality lower than that necessary to protect the existing and designated uses in the ORWs. Such temporary and short-term degradation shall only be allowed after all practical means of minimizing such degradation are implemented. Best Management Practices (BMPs), as described in this report and other mitigations elsewhere in the EA, represent "all practical means" and would be used for any of the Action Alternatives."

One method of minimizing such impacts to water quality is to require winter harvest to minimize ground disturbance, as suggested by the Conservation Law Foundation. However, this is only one of multiple methods of minimizing impacts to ORWs. On page 62 of the EA, it states, "Minimizing the area of disturbed forest floor is a big step in controlling erosion and sediment movement to streams. This is accomplished by careful consideration of skid trail location, minimizing the number of skid trails, and avoiding steep slopes and wet areas. Other mitigations include the use of waterbars, avoiding operations during saturated and muddy periods, avoiding disturbance to stream channels, and limiting harvest to dry or frozen conditions." As described in the EA, if a unit is harvested in summer or fall, then dry soils will be required.

As stated in the EA, at the bottom of section 3.4.1, "Units 1, 2, 3, 4, 6, 7, 10, 11, 12, 13, 15, 16, 20, 21, 23, 24, 26, 28, 29 and 30 are in a semi-closed canopy condition due to moderate to severe ice damage. Natural regeneration in these units includes an abundance of advanced beech regeneration that is likely to out-compete the sugar maple, ash and oak seedlings. Sugar maple, ash and oak seedlings are limited by canopy conditions and in some locations, are absent. Soil scarification during non-frozen soil conditions would aid the germination and establishment of these species, and the stands eventual recovery of a diverse species mix. Stand health and resistance to insects and disease is increased with species diversity, and over time provides a safety net against future catastrophic biotic events. To achieve this objective, harvest operating seasons should allow for soil scarification."

Other references to soil scarification, germination, and season of harvest can be found on EA pages 42, and in Vegetation section 3.12, page 128.

Comment 12.4: *"Additionally, the EA describes new stream crossings that will be built in order to access the target units; one a temporary bridge that would be in existence for 2 to 3 years and other temporary bridges for Alternatives 2 and 4. Mitigation is not described."*

Response to Comment 12.4: Mitigations to stream crossings were discussed in the EA. In regards to the bridge which crosses Slippery Brook, EA Section 3.3.3.1, on page 64 states, "[The] construction would occur in the floodplain and would potentially result in altered storm flows. To help mitigate these impacts, the ramp will be made of large porous rocks and will contain culverts so that if water flows onto the floodplain it would not wash out the ramp. Sediment control measures, such as sediment fences and proper road drainage structures, would therefore be needed along that portion of NFSR 17A that lies in the 100-year floodplain. This would prevent excess sediment from reaching the channel should a large storm event occur while the bridge and ramp are in place." In regards to the additional temporary bridges, the EA states on page 64, "All bridges will be wide enough so as not to constrict the stream channel during bankfull flows. Construction will be done in accordance with Best Management Practices (BMPs). In addition, bridges will be removed and banks restored following the completion of the timber sale." In addition to these mitigations, monitoring of the stream crossings will be conducted throughout the timber sale. A hydrologist will be notified by the sale administrator if any problems occur.

Comment 12.5: "*More importantly, the EA still resorts to conculsory comments in order to support it contention that the "direct and indirect effects on water quality from the proposed Action Alternatives are anticipated to be small and direct" (EA at 65) This statement is based on a generalized observation that existing roads, trails and other infrastructure demonstrate what can be expected over a period of several years. These anecdotal observations do not pertain to the prescribed actions contemplated by this specific proposal. The EA therefore fails to adequately consider the impact of management activities on ORW's pursuant to the New Hampshire standard under any alternative."*

Response to Comment 12.5: The effectiveness of mitigations can be demonstrated by looking at previous projects, both on and off-site, and by literature review. These types of harvesting activities which the proposed project is compared to are the same or similar as described in the action alternatives and they occur in the same area. Within the Chandler Round project area, roads and skid trails are well vegetated. There is no evidence of rills or ruts, and road drainage was effective. Monitoring of timber sale mitigations occurs throughout the forest to ensure that mitigations are effective. Forest-wide monitoring supports statements made in the EA that prescribed mitigations are effective. In addition, scientific research is sited in the EA which supports the field monitoring.

Additional mitigations are provided in Section 3.3.3.1 of the EA including stream buffers and limited marking in riparian areas. The EA states on page 66 "Forest Plan Standards and Guidelines require that at least 50% of the basal area be retained in the riparian area of perennial streams. These 'partial treatment' corridors are at least 50 feet wide, and increase with increasing slope. In addition to BMPs and Forest Plan Standards and Guidelines, the Chandler Round Project is providing additional mitigations to further protect the water quality of streams. All mapped perennial and intermittent channels will receive at least a 15 foot no-cut buffer. In some areas, such as the west side of Slippery

Brook, this buffer even wider and may exceed 100 feet. These no-cut buffers will further reduce the likelihood of adverse water quality effects. Equipment is not allowed in these buffer areas except at designated crossings, which are limited in number and location".

The EA also states, "Extensive timber harvest has the potential to cause chemical changes in water. Of the various chemical changes, studies have shown that it is the changes to nitrate concentrations that have the potential to exceed water quality standards for short periods of time after the removal of trees. However, high nitrate concentrations were associated with clearcutting entire watersheds (Pierce et al, 1970), while watersheds treated with more conventional methods, such as those proposed in Chandler Round, did not exceed water quality standards for nitrate (Hornbeck et al, 1973).

And "In the Chandler Round Timber Sale, no more than 22% of any one subwatershed is being proposed for harvesting. Within HMU 505, about 12 percent of the HMU would be treated (including wildlife openings and proposed road activities) under Alternative 2, and less under alternatives 4 and 3 In addition, of the acres to be harvested, the majority are partial cuts, not clearcuts. Only 2.3 percent of the HMU would receive clearcuts. Since entire watersheds are not being clearcut, it is unlikely that the proposed treatments would cause increased nutrient concentrations in the streams.

And finally that "In addition, stream nitrate concentrations have unexpectedly declined in White Mountain National Forest streams (Goodale et al. 2003). This indicates that soil nitrogen saturation may not be the concern originally visualized. It also may indicate that soil and stream acidification may be of less concern than originally thought."

Comment 12.6: *"The Forest Service is obligated to evaluate management activities with reference to identified and adequately monitored management indicator species."*

Response to Comment 12.6: The Chandler Round project Environmental Assessment (EA) addresses all Management Indicator Species (MIS) listed in the Forest Plan, their current status, population trends, and effects of each alternative (pgs 106-120).

Comment 12.7: "*Sensitive species should be managed in accordance with Forest Plan and Forest Service Manual direction. Several important directives in FSM 2670.22 regarding sensitive species instruct the Forest Service to:*
Develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions,"

Response to Comment 12.7: A Biological Evaluation (BE) was prepared for the Chandler Round Vegetation Management Project that addresses all Federally Threatened, Endangered and Proposed Species (TEPS), as well as the Regional Forester's Sensitive Species (RFSS). See the response to Comment 3.1 for a more detailed description of how RFSS was analyzed. The Chandler Round BE analyzed effects to RFSS in accordance with the direction described in FSM 2670.22, and none of the management practices proposed in the Chandler Round project will cause any species to become threatened or endangered. A summary of the BE is included in the EA (pgs 124-126).

The entire BE is located in the Project File. In addition, an effects analysis was conducted on species that were identified through Forest Plan revision as potentially having a viability concern. This analysis of "Species with Potential Viability Concerns" is found on pages 119-120 and in Appendix A (pages 138-146) of the Chandler Round EA.

Comment 12.8: *"Maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands, and…Develop and implement management objectives for populations and/or habitat of sensitive species"*

Response to Comment 12.8: The Chandler Round EA analyzes effects of the Proposed Action and its alternatives on Threatened, Endangered and Proposed Species (TEPS), Regional Forester's Sensitive Species (RFSS), Species with Potential Viability Concerns (SVE), and Management Indicator Species (MIS). In addition, the EA considers effects on rare and exemplary communities (NHNHB Inventory). Development of management objectives for populations and/or habitat of sensitive species is addressed at the Forest Plan level, and is beyond the scope of this project. Implementation of management objectives for populations and/or habitat of sensitive species is addressed as either a beneficial effect or a mitigated effect of the proposed activities (EA Sections 3.7 Wildlife and 3.8 Management Indicator Species). In all cases, the Chandler Round project does not cause a threat to the viability of any species, either directly, indirectly or cumulatively.

Comment 12.9: "*In order to maintain viable populations of sensitive species the Forest Service must develop and implement management practices and objectives for populations and/or habitat of sensitive species so that they do not become threatened or endangered because of Forest Service actions. The Forest Service's assessment should include monitoring, evaluation and survey work that reflects this analysis of these concerns in and around the project area."*

Response to Comment 12.9: With regard to monitoring of sensitive species, plant surveys for sensitive plants were conducted in the Project Area. Units that have shown marginal suitable habitat for some species are scheduled to be surveyed again prior to project implementation. Regarding surveys for sensitive animal species within the Project Area, the effects analysis was conducted as though these animal species are present (see Chapter 3.10).

Comment 13.1: *"I am writing in regards to the proposed Chandler Mountain project and the impact it will have on recreational activities in the White Mountains. Northern Extremes Snowmobiling utilizes this area for guided snowmobile tours and rentals in lean snow months. … My biggest concern is once logging starts this area will be closed for recreation use for 3 years. This will close a major access point to corridor 19 snowmobile trail. Presently the Slippery Brook parking area is the closest place to access Corridor 19 for individuals staying in the Bartlet and Jackson area. This parking area is ideal for individuals who want to avoid the congestion of North Conway area. Each*

season hundreds of people use this trailhead to access corridor 19."

Response to Comment 13.1: The recreation use of the Project Area, including snowmobiling, is addressed in the Chandler Round EA in Section 3.5 on pages 85-92. While there may be short term closures to sections of snowmobile trails while logging is being conducted, the trail mileage that is affected is a small portion of the total trail system, and there are other access points that can be used by the public. The timber sale contract will prohibit the hauling of timber on weekends and federal holidays so the Slippery Brook road may be used for snowmobiling during that time period.